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CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

Briefly Told 881

Excellent Work by the Committee of the Ohio Gas Light Association on Standardizing Methods for Testing Fuel Gas Appliances—Notes.

American Methods of Enhancing the Usefulness of District Gas Managers' Associations 882

Twenty-sixth Annual Meeting, Western Gas Association—Official Report—Revised by the Secretary 882

First Day, Morning Session—The Welcoming Address—Mr. Doty's Response—President Barret's Welcome—Report of the Board of Directors—Appointment of Special Committees—Report of Secretary and Treasurer—A Brace of Invitations—*The High Pressure Gas Main Under the Mississippi River, by Mr. Thos. D. Miller—Discussion—Captain White Makes an Explanation.

*Report of the Committee Appointed by the Ohio Gas Light Association to Determine Standard Methods of Testing Fuel Gas Appliances—Concluded from Page 844 889

The Comparative Life of Horizontal and Inclined Retorts 892

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 892

Mr. Case Makes a Correction—Mr. Forstall on Cement vs. Lead Joints—Mr. J. T Pullen Goes to Ottawa, Ills.—Annual Meeting, Consumers Company, Reading, Pa.—Something from Seneca Falls and Waterloo, N. Y.—An Interesting Decision—New Stock Issue, Cambridge, Mass.—Shenandoah, Iowa, has Gas—Cheaper Gas for Norwalk, Conn.—Granted Permission to Pipe the Streets of Wilmington, Del.—A Hint from Cincinnati—Another Legal Decision—And Other Items.

The Market for Gas Securities 894

BRIEFLY TOLD.

EXCELLENT WORK BY THE COMMITTEE OF THE OHIO GAS LIGHT ASSOCIATION ON STANDARDIZING METHODS FOR TESTING FUEL GAS APPLIANCES.—Some time ago the Ohio Gas Light Association took up the matter of the confusion that existed in the ways and means or practice adopted by gas companies to determine the value to them and to their customers of the fuel gas appliances that were being offered for sale by the one and put into practical use by the other. The Committee named to consider this perplexing subject was composed of Messrs. Henry L. Doherty, F. W. Stone and John Franklin. This composition guaranteed a sound threshing out of the problems involved, for each of the three had much to do with them. At the outset the committeemen were faced by the cold fact that there were almost as many methods of testing in use as there were numbers and styles of appliances on the market. Nothing daunted, however, they went on with their task and the result of their joint labors is the presentation of a report that is comprehensive and practical; we had almost said complete. The findings of the Committee are reported in our issues for last week and this, and we are sure that our readers, in belief with ourselves, will assent to the verdict that their work was well and worthily done; even though some (who will include, perhaps, a few of the manufacturers) may object to the rigidity of the tests set up.

NOTES.—

"F. R. P.", writing under date of May 31st, says that the many friends of Peter G. Van Wie will be shocked over hearing of his death, which occurred at St. Vincent's Hospital, Toledo, O., the afternoon of May 30th. About two weeks prior Mr. Van Wie was removed to the hospital suffering from an attack of nephritis. Shortly after his admission he became unconscious, and gradually sank to the ending. Deceased was prominently connected with the development of the construction and placing of the gas range, under what might be called the American practice, for quite on to a quarter of a century. He is survived by a son, Edward G. Van Wie. Deceased, who was in his 59th year, was well and favorably known to the gas industry of America.

To meet the amazing increased demand for gas in Providence, R. I., the resources of the Providence Gas Company have been sorely taxed. In fact, the taxing was so great that its conservative proprietors were fairly driven to the point of providing for the wants of their patrons by agreeing to and ordering an increase in the Company's manufacturing facilities. After much consideration they finally determined to award to the Western Gas Construction Company a contract to install at the South Station two sets of water gas apparatus, each of a capacity of two millions cubic feet per day. The apparatus is to carry the Western's system of extended superheaters and carburettors, divided generator blast and oil feed method. The contractor will also supply engines, blowers and elevator for making the installation complete. The Providence Company has also authorized the contractor to place a condensation plant up to the treatment of three millions cubic feet of coal gas per diem, the apparatus to be arranged according to the Western Company's system of "regulated condensation" and tar extraction.

AT the regular annual meeting of the Roanoke (Va.) Gas and Water Company, the following officers were elected: Directors, Alfred M.

LIBRARY OF CONGRESS. JUN 8 1903 SMITHSONIAN DEPOSIT.

Fuller, W. B. Campbell, H. S. Trout, F. T. Brinkley, Jos. W. Coxe, W. K. Andrews and John T. Trout; President, H. S. Trout; Secretary and Treasurer, H. M. Darnall; Superintendent of Works, H. H. Baughman.

MR. NORMAN G. KENAN has been selected for an indefinite period to perform the duties of President to the Cincinnati Gas Light and Coke Company. General Hickenlooper's physical condition remains practically the same, but his family hope and believe that in a very short while he will be able to take a prolonged trip abroad.

A CORRESPONDENT in San Francisco forwards the following wail from the organization chiefly concerned—they do not like consolidation, although Mr. Spreckels shortly will:

"*Resolved*, by the Gas Workers' Union, No. 9840, American Federation of Labor of San Francisco, in regular session assembled, this 19th day of May, 1903, that we strongly denounce the methods and tactics of any company or corporation that has or may anticipate using employees of mechanical departments in forming an organization to assist in destroying competition; and be it further

"*Resolved*, that we request all union men affiliated with this union to faithfully perform the duties for which they are hired, and to refuse absolutely to enter into any such combination with any company or corporation, no matter what the promises may be; and be it further

"*Resolved*, that we, as loyal union men, will assist in all possible manner to discourage such acts of any company or corporation, or clerical department, that may or will, in the present or at any future time, undertake to organize any such organization; and be it further

"*Resolved*, that it is the intention of this union not to interfere with any employer, providing he be not antagonistic to this union and lives up to our requirements as to hours and wages or trade rules. Signed, S. SCHWARTZ, Corresponding Secretary."

THE formal transfer of the plant of the Michigan City (Ind.) Gas Light Company to the Michigan City and Northern Indiana Gas Company, was made last week. The officers of the new concern are: President, C. H. Geist; Vice-President, Rufus E. Dawes; Treasurer and General Manager, Isaac C. Elston, Jr. Mr. Elston will have the active management of the business and works.

THE Practical Gas Construction Company, of Chicago, has been awarded a contract for the erection of a gas works at Armstrong, Minn.

THE Secretary of State has authorized the incorporation of the Taylorville (Ills.) Gas and Electric Company, with a capital stock of $85,000. Its promoters are D. D. Shumway, G. F. Shumway and Thos. R. Johns. It is organized for the purpose of consolidating the business of the Citizens Gas Company and the Taylorville Electric Company.

American Methods of Enhancing the Usefulness of District Gas Managers' Associations.

The *Journal of Gas Lighting*, in editorial comment on the topic named in the heading, printed in its issue for the 26th ult., had this to say: We have been giving some prominence, the past week or two, to the Progress Department of the Ohio Gas Light Association, as edited by Mr. Irwin Butterworth; and this week we publish an abbreviated account of the Question Box Department. We say "abbreviated" advisedly, seeing that the original report, as printed for circulation among the members in advance (which was noticed in the *Journal* for the 14th ult.), is a document of some 150 pages, comprising 160 questions, with a number of answers contributed by 73 members. Mr. Henry L. Doherty is the Editor of the Question Box; and in submitting his report, he expressed some disappointment at the incompleteness of the answers, and in an apologetic tone promised better things next year. From this, it would appear that his ideas of a fully complete report are something approaching the whole of the other transactions in extent. Secretaries and Presidents of District Societies will cast envious eyes on the Ohio Association, in respect to such enthusiastic members as Messrs. Butterworth and Doherty; while the dilettante member who considers he fully discharges his duty by showing up at a meeting occasionally, and by remitting the annual dues (none too punctually), will be simply appalled at the extent of the labor undertaken by the Editors of the "Progress Department" and the "Question Box" respectively. We do not care to pass such labors without a word of appreciation, not merely of the intrinsic value of the work, but also of the extent of time and trouble so ungrudgingly devoted to an endeavor to raise the platform of the Ohio Gas Light Association. If every similar society possessed equally active workers on the list of members, the Association would indeed become a power in the land.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.]

TWENTY-SIXTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD AT INDIANAPOLIS, IND., IN THE CLAYPOOL HOTEL, MAY 20, 21 AND 22, 1903.

FIRST DAY—MORNING SESSION.

The Twenty-sixth annual meeting of the Western Gas Association was called to order at 10 A.M. of May 20th, by the President, Mr. A. H. Barret, of Louisville, Ky. Secretary, J. W. Dunbar, of New Albany, Ind., occupied the recorder's desk.

THE WELCOMING ADDRESS.

The President introduced the Honorable Charles A. Bookwalter, Mayor of Indianapolis, who welcomed the Association thus:

Mr. President and Members of the Western Gas Association: Indianapolis never pleads guilty to being unable to welcome and entertain her guests, and I assure you that to-day she will not be false to that record. We, in Indianapolis, are proud of the opportunity of thus extending to the members of your Association a cordial Hoosier welcome. (Applause.) We feel that as you are representatives of that fortunate element which has absolute control of 50 per cent. of the necessities of life, light and heat, and if the charges of some of our fellow citizens are to be believed, when they attempt to turn on the key at the mixer of the natural gas burner, they find you are also in control of a large proportion of the air (that other necessity), that you are especially welcome to Indianapolis. I do not intend, as one of your delegates suggested this morning, to present to you the keys of this city, because when good people come to a good town, if they show the appreciation the people of that good town have for the good people, we have established a rule in Indianapolis of unlocking things and hiding the key for future use. I do want you to understand while you are in the city that the Gas Company is willing, and we are always willing, to extend to you the privilege of burning their product all night. (Applause.) We expect during your stay to be benefited, of course, but we trust that during your stay you will not only be benefited in a better understanding of the business which makes up your life work, but that you will be benefited by the opportunity which we intend to give you of seeing not only the beauty, but the beauties of Indianapolis. (Applause.) I know that my good friend Pearson, and that the canny Scotchman, Somerville, will not allow you at any stage of this convention to remember the fact that you are away from home, because we know they will make you feel at home always; but I wish to say to you if at any time during your stay in Indianapolis these gentlemen are unable to secure for you that which you most desire, if you will but lodge a complaint in my office I will call out the police department and endeavor to secure it for you myself. (Applause.) You are welcome to Indianapolis, and while you are here we don't want you to forget the fact that, while you are making gas, light and heat for your sections of this, our common country, we in Indianapolis are doing the same thing, and, in addition, during our leisure hours are manufacturing books which go to entertain you after you go to your homes from the gas works. We want you to remember that Indianapolis is the center of this great State in which was born "Ben Hur;" that Indianapolis is the center of the great State where "Alice of Old Vincennes" charmed the early settlers of the southwest section. We want you to understand that in Indianapolis the gay and frisky Frenchman, Monsieur Beau Caire. first saw the light of day. We want you to understand that in Indianapolis an astute politician, the gentleman who organized the machine, the "Gentleman from Indiana," and went to Congress from the printing office was born. We want you to understand that over here in the little town of Shelbyville not only was Dorothy Vernon given to the world, but that sweetest little love tale ever told, except the ones we ourselves have told to one particular girl, "When Knighthood was in Flower," was given to our good people. While you are here don't forget these things. We want you to talk about them when you go away; but above all things we wish you to carry away pleasant memories and pleasant recollections of the welcome the people of Indianapolis desired to extend to you. I thank you. (Great applause.)

MR. DOTY'S RESPONSE.

At the call of the President Mr. Paul Doty made the following response to the Mayor's welcome:

Mr. Mayor and Gentlemen of the Association: It is surely most pleasant to be welcomed in such hospitable manner by you, representing as you do this great city; but it is something more to be welcome in a city,

not merely to be welcomed, that has a gas company with the reputation of fair dealing and strict integrity that the Indianapolis Gas Company has. It certainly gives us pleasure and inspiration for our own home work, that we ourselves may make our own companies welcome in the community. I was greatly impressed by the Mayor's recital of the literary abilities of Indianapolis and Indiana, and those who have been fortunate enough to read the books must know and must feel the delight which Indiana books have given to ourselves; and we have in the person of Mayor Bookwalter a typical "Gentleman from Indiana." Now, these men you see around you as representatives of the gas interests of the Middle West are banded as the Western Gas Association. They meet annually to discuss certain problems connected with the manufacture and distribution of gas and the operation of gas works; and, more important still, we are giving thought now to the relations which should exist between the municipality and the gas company. We recognize that there is a unity of interest. If you will examine the paper list (probably you have a copy of it) you will notice a variety of subjects, one of which subjects is to treat on the question of relation of municipalities to public utility. Naturally in a meeting of this kind there are many men, and to some of these men Indianapolis means the thought of home. I was talking with a gentleman yesterday who left Indianapolis hurriedly 20 years ago; at that time he was employed in the gas works and when he left he left his overalls. He went out to the works yesterday to look for the garments, but greatly to his surprise and disappointment the overalls were gone. You see other men around you; several of them probably lay claim to the title of philanthropist. A philanthropist is defined as one who makes two blades of grass grow where only one grew before, so the baldheaded gentleman over there can fairly lay claim to being a philanthropist, since he makes two shares of stock grow where only one grew before. He truly is a philanthropist. This meeting has two sides naturally—serious and business ones—but our main purpose is given to the discussion of papers and the exchange of ideas, and on the other hand is another side—the pleasant one; and certainly no one who has had the pleasure of listening to your welcome can feel anything else than that a genuine hospitality has been extended to us—a typical Hoosier welcome. (Applause.)

President Barret's Welcome.

The President—The next thing in order would be the President's address. I want to take this opportunity of thanking the Association for the honor extended to me by my election to fill this office at your last meeting in New Orleans during my absence. That absence was unavoidable on account of emergencies. It has been an established custom of the President to present an address to the Association. In considering this practice, and looking over the work of my predecessors, searching for ground that was acceptable for such an address, I came to the conclusion that, owing to the thoroughness of the research of my predecessors, little or nothing is left for me to say, nothing having occurred of striking interest since your last meeting. I, therefore, concluded that the best interests of the Association would be covered by spending the time usually occupied in the President's address in listening to the papers and to the discussions thereon. I report to the Association that, since your last meeting, we have lost by death Mr. E. H. Jenkins and Mr. Julius Buss. The next order of business is the

Report of the Board of Directors.

The report was read by the Secretary as follows:

Indianapolis, Ind., May 20, 1903.

To the Members of the Western Gas Association: The annual meeting of the Board of Directors of the Western Gas Association was held in the Claypool Hotel, May 19th, 1903.

The meeting was called to order by the President, Mr. A. H. Barret, with the following members present:

O. O. Thwing,	Thos. D. Miller,	J. B. Howard,	Paul Doty,
John Gimper,	Wm. McDonald,	Jas. Somerville,	J.W. Dunbar.

On motion of Mr. J. B. Howard the following papers were accepted for presentation to the Association:

Low Candle Power Gas, by Capt. Wm. Henry White.
Wrinkle Department, by Mr. W. E. Steinwedell, Editor.
Gas and Meters, by Mr. John McIlhenny.
Maximum Economical Yield of Gas per Pound of Coal Carbonized, by Mr. James Somerville.
Report on the Heat Conductivity of Different Clays, by Mr. H. A. Wheeler.
The High Pressure Gas Main under the Mississippi River at New Orleans, by Mr. Thos. D. Miller.
Increasing Gas Sales to Present Consumers, by Mr. B. W. Perkins.
Naphthaline, by Dr. W. H. Birchmore.
Municipal Ownership of Public Utilities, by Mr. A. E. Boardman.
Quadrupling the Capacity of an Ordinary Purifier House at very Small Cost, by Mr. F. H. Shelton.

The President appointed the following Committees:

On Auditing.—Thos. D. Miller, John Gimper, Paul Doty.

On Introduction of Visitors.—J. B. Howard, Jas. Somerville, O. O. Thwing.

On Membership.—Wm. McDonald, F. H. Shelton, Geo. F. Goodnow.

On motion of Mr. Thos. D. Miller the Secretary was instructed to draw on each member of the Association who may be delinquent for dues on August 1st, 1903.

On motion of Mr. Thos. D. Miller it was passed that recommendations be made that Article 7 of the by-laws, providing for an annual meeting of the Executive Committee, be repealed, and that the President assume the duties now performed by said Committee.

On motion of Mr. Wm. McDonald it was decided to recommend to the Association that no person shall be elected an Honorary Member of the Association unless the name be first submitted to the Board of Directors and recommended by them to the Association.

Report of Secretary and Treasurer.

Mr. Dunbar, as Treasurer, reported a total receipt for the year (including balance of $85.23 from 1902), $1,881.23, an expenditure of $1,343.78, and a balance of $537.45.

As Secretary, Mr. Dunbar reported a total membership, May 1st, 1903, of 379.

On motion, the reports were adopted and the recommendations contained therein were agreed to.

A Brace of Invitations.

The Secretary read the following invitations:

Indianapolis, Ind., May 18, 1903.

Mr. James Somerville, Engineer and Superintendent, Indianapolis Gas Company, City: Dear Sir: Your esteemed favor of 16th inst. duly received. It will afford me great pleasure to place my private car at the service of the ladies and gentlemen of your party, upon the occasion of the meeting of the Western Gas Association at the Claypool Hotel in this city, 20-22 insts. Kindly inform me upon which of these dates you wish to use the car, also the hour.

In these days of wonderful achievement in the gas field, I scarcely thought you would resort to trolley locomotion, but would use instead some inflated means of transportation.

Again assuring your organization that it affords me great pleasure to be of service to them, I am, Yours very truly, Hugh J. McGowan.

Indianapolis, Ind., May 19, 1903.

Mr. James Somerville, City: Dear Mr. Somerville: On behalf of the Commercial Club I take great pleasure in extending through you, to the delegates to the Western Gas Association, a most cordial welcome to the city and the privileges of the Club during their stay in the city. If you desire or think it necessary, I will take pleasure in furnishing each of them a visitor's card which will entitle them to the Club rooms. Awaiting your pleasure, I remain, Very truly yours,

Lewis Hoover, Secretary.

On motion of Mr. Howard the invitations were accepted, with thanks.

Chairman J. B. Howard, on behalf of the Committee on Introduction of Visitors, invited the visitors to share in the proceedings, and assured them that the Association would welcome their voices as well as their presence.

The President named as the Committee on Place for Next Meeting, Messrs. F. H. Shelton, E. G. Cowdery and Geo. D. Roper, directing them to report Thursday morning.

The President then introduced Mr. Thomas D. Miller, of New Orleans, La., who read the following paper on

THE HIGH PRESSURE GAS MAIN UNDER THE MISSISSIPPI RIVER.

The distance from Cairo to New Orleans is 868 miles, and the fall of the river in that distance is 278.74 feet, or about .32 feet per mile.

The lowest water known at New Orleans was 0.43 feet, on the Canal street gauge. The zero of this gauge is 2.53 feet below mean Gulf level. The highest water known prior to this year was May 7th, 1897, when this gauge showed 19.5 feet. This past spring (1903) the gauge showed 20.3 feet on March 29 and 30, with a terrific current flowing. The Mississippi river has the reputation of being extremely fickle throughout her entire course, and the barrels of money spent on her banks by the National and State governments have not accomplished

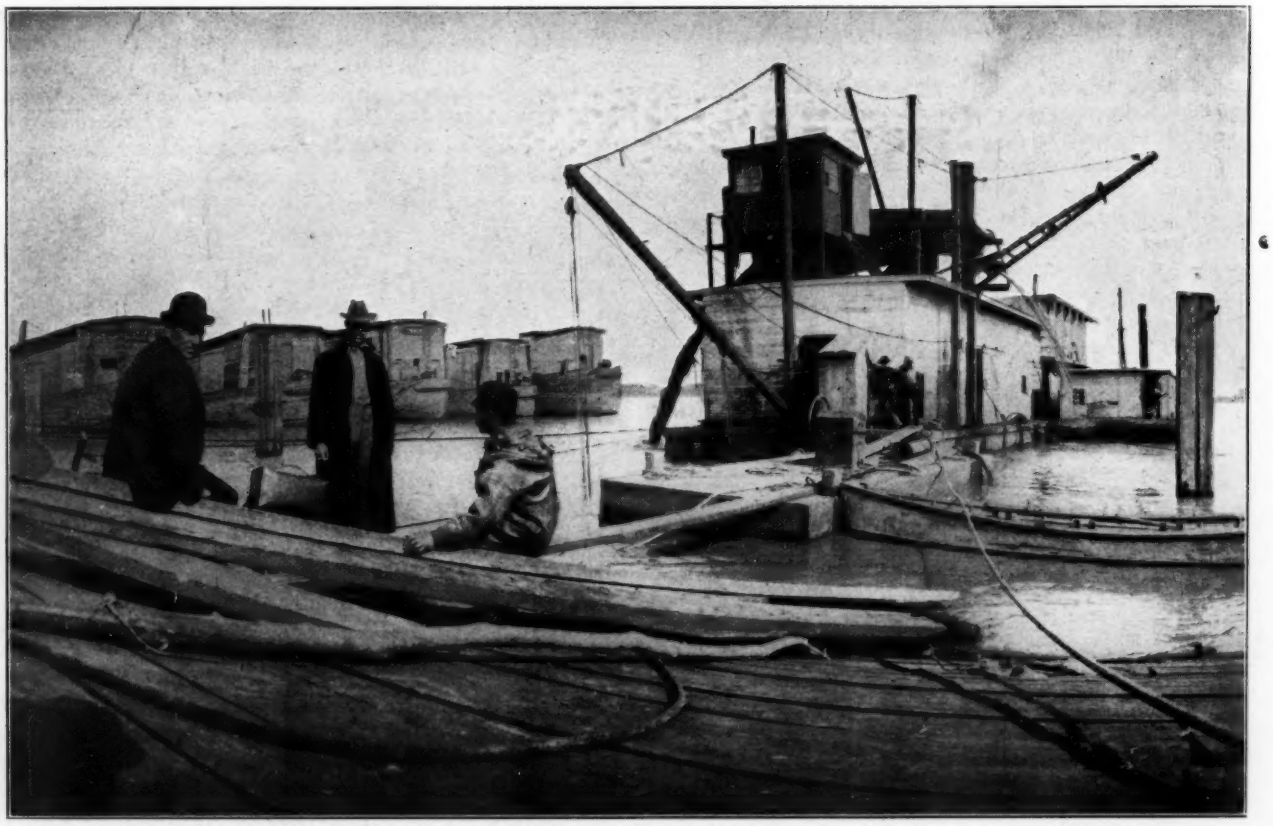
more than to confine the channel through specific stretches. For miles and miles above and below New Orleans the low, flat plantation lands are protected by levees, many miles of which are protected from the current by piling and sheeting, or mattress work; but for this the river might move over several miles in this section of the country during high water times.

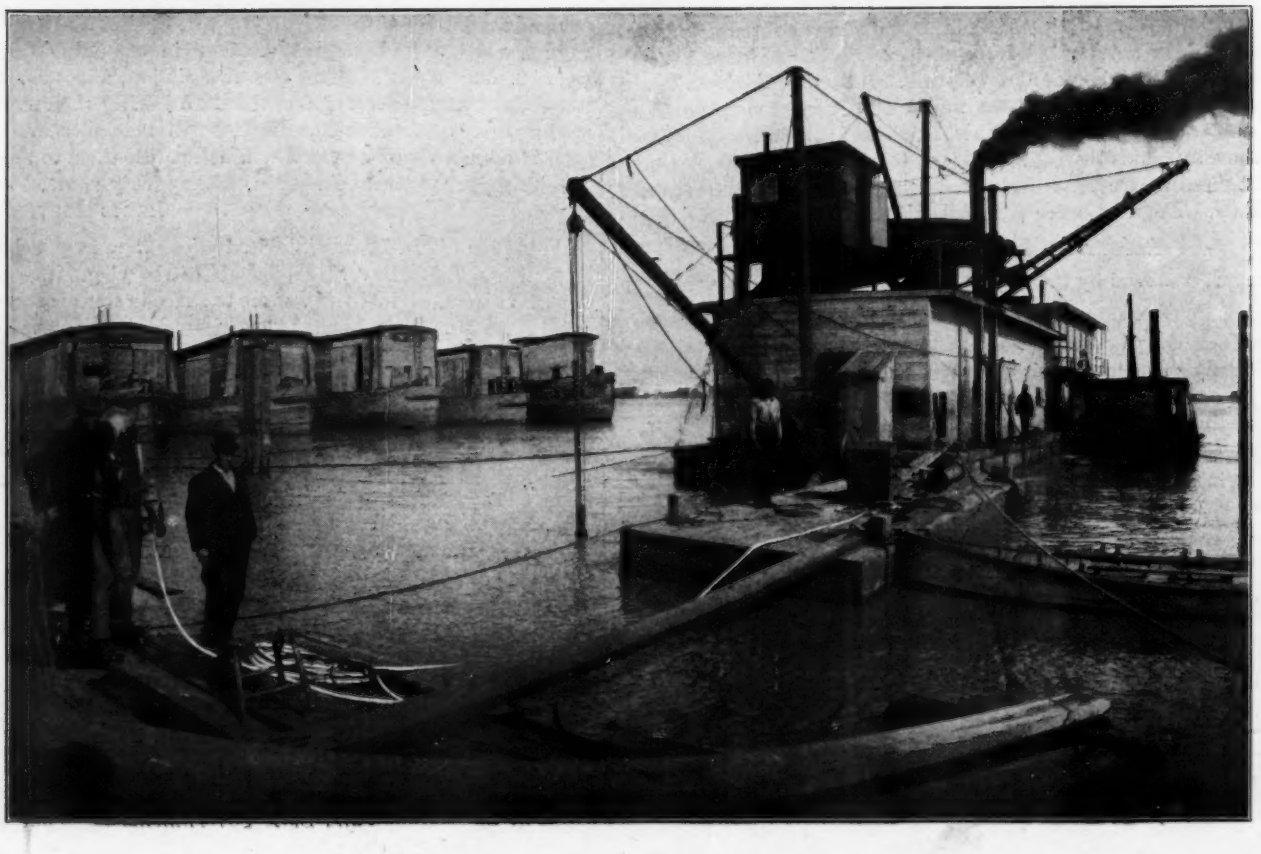
It having been decided to supply Algiers with gas furnished through a high pressure main laid on the bottom of this river, old and experienced river men were asked as to various points involved in the proposed work, and several engineers were consulted, but the majority of them regarded the plan as unfeasible.

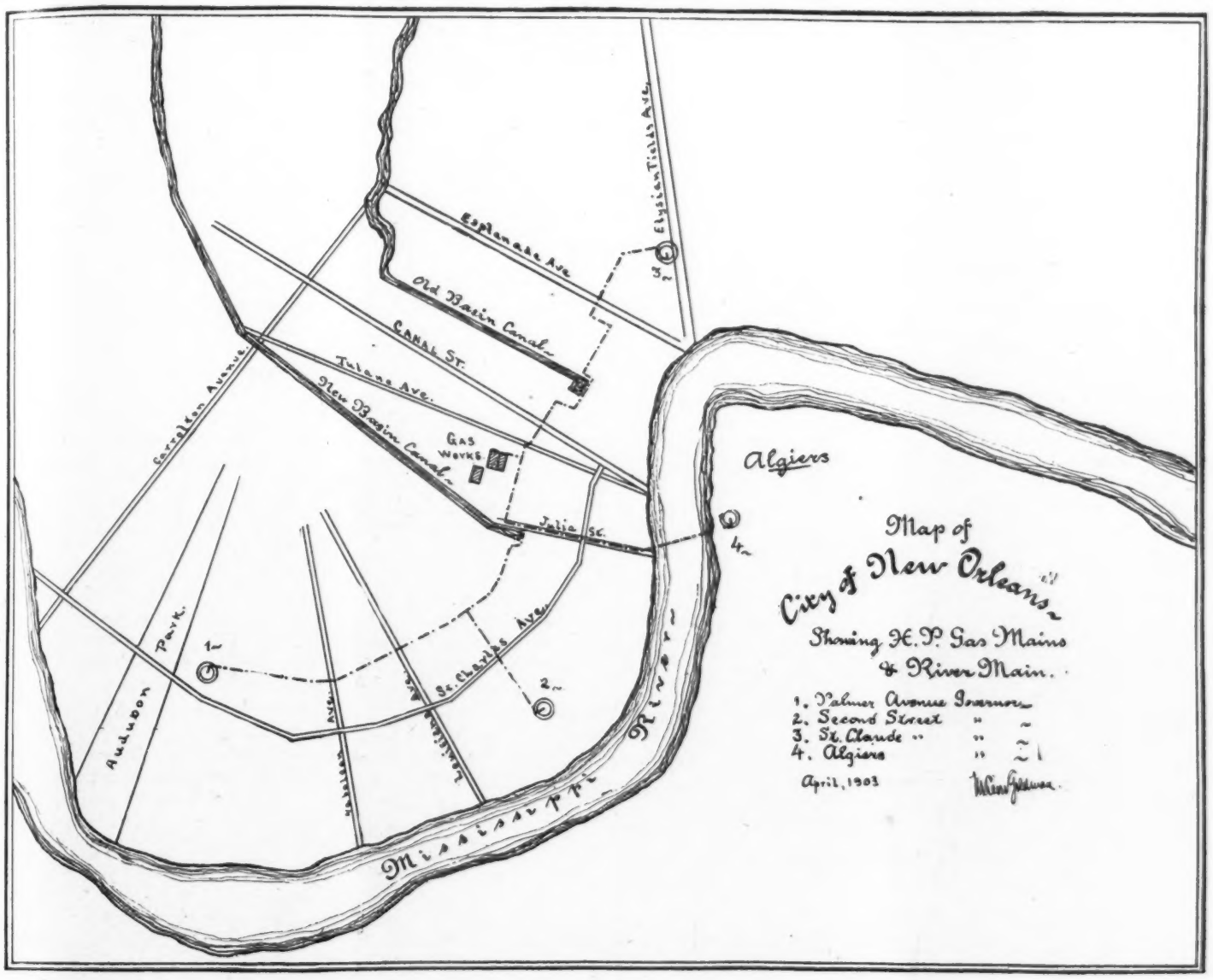
The reasons assigned were:

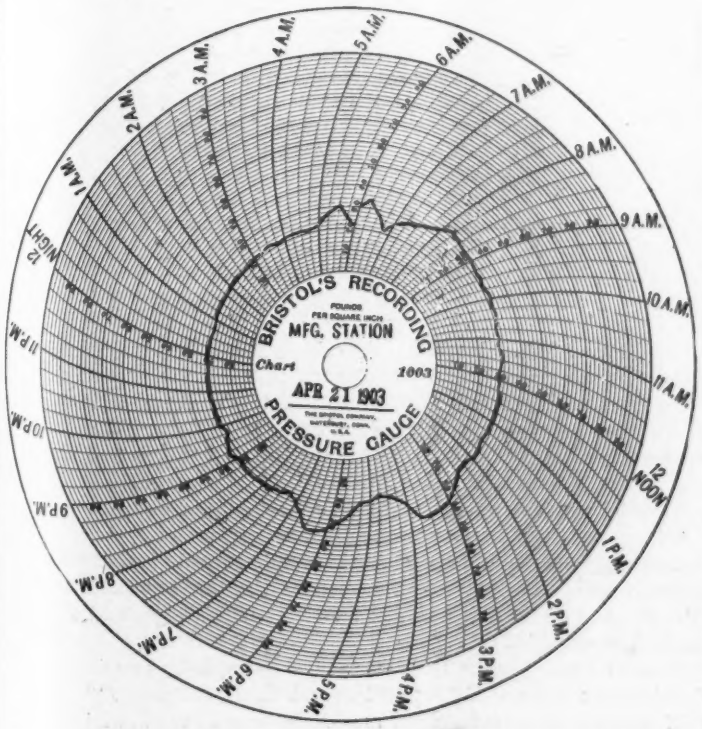
1st. The extreme depth of the river; 2d, the constantly shifting bed of the stream; 3d, the swift current in the main channel; 4th, the fact that in the bed of the river lies the wrecks of any number of crafts of all characters.

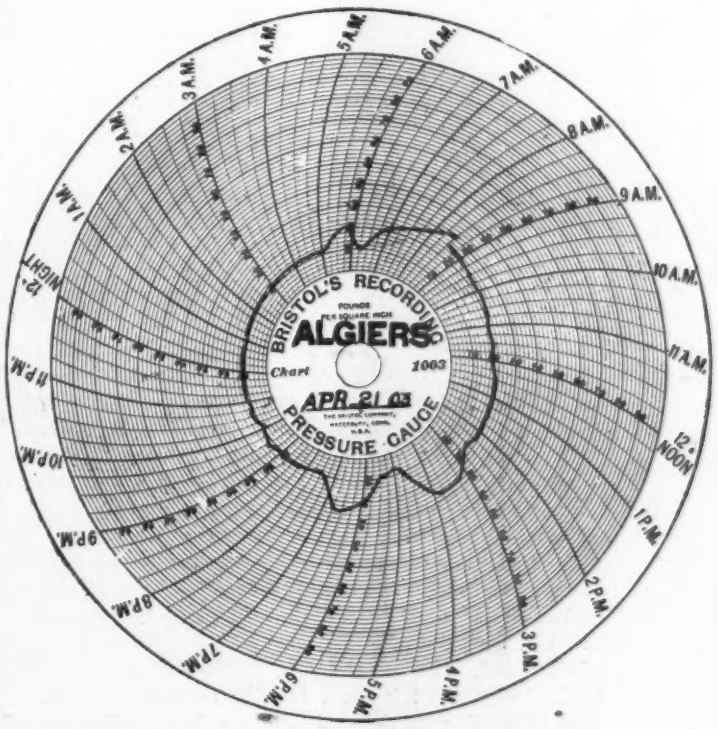
In the selection of a point for laying the pipe, of course, permission of the Port Commissioners had to be obtained. The head of Julia street was selected because it was conveniently located for the high pressure main leading from the works. There was no special dock constructed at this point. The levee was low here and the point in Algiers immediately opposite was a desirable one to enter. Last, but not least, the Port Commissioners were willing that the pipe should be installed at this place. The accompanying drawings show the location and profiles.





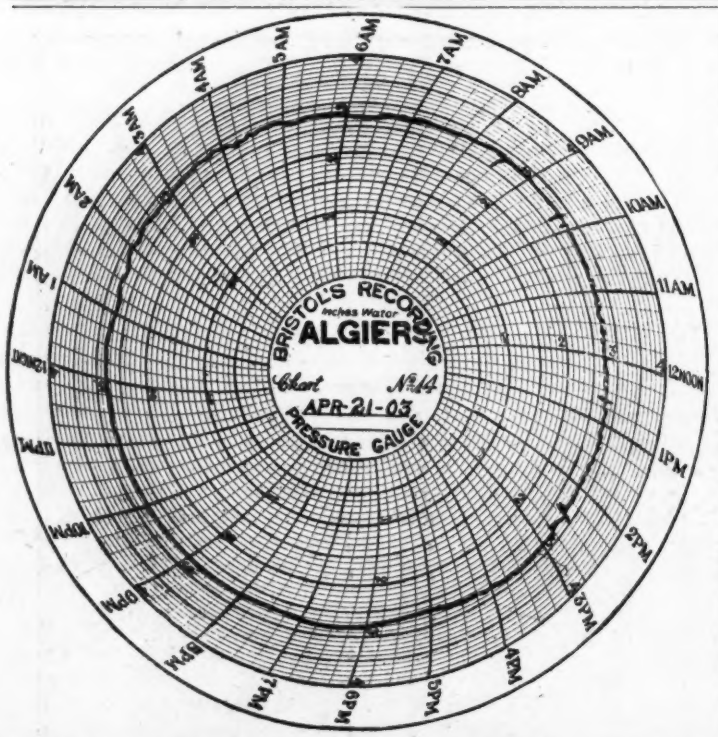


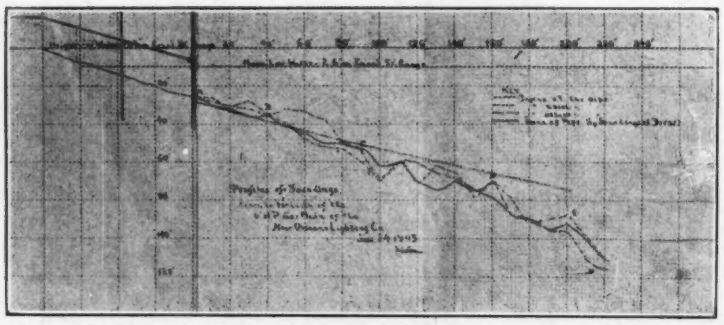




The description of the work of laying the high pressure gas main under the Mississippi, at New Orleans, is given to you as Mr. W. D. Marshall, Superintendent of the plant, and Mr. M. L. Goldman, his draughtsman, gave it to me. Mr. Marshall was in charge of this work, under the direction of Mr. C. T. Sloan, whose experience has fitted him to take charge of a work so unprecedented in its character.

Having located by soundings the exact point at which the pipe was to enter the water, the power to be used in pulling the pipe across the





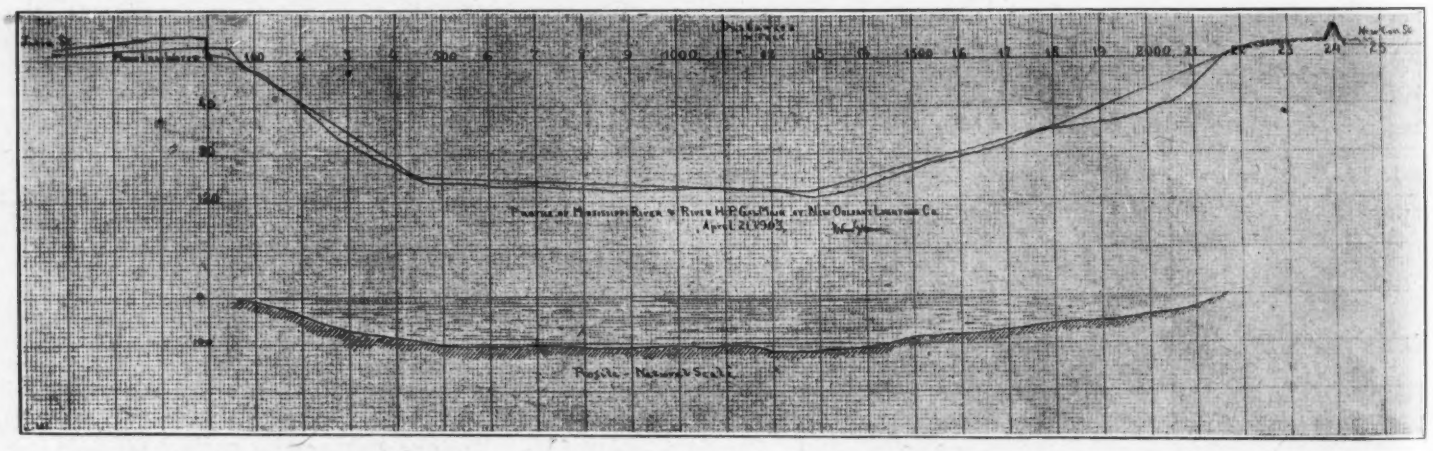
steel, weighing about 300 pounds, about 3 feet long, and held together by eight ⅝-inch by 4-inch bolts, with washers at each end; the bolts being split at the end to rivet them on. The first 3 sleeves were screwed as tightly as possible, and the remainder moderately tight, in order to allow some little play. The shore end of the pipe was kept closed with a short length of pipe with a plug in it. This was done so that in case the pipe got into the river it would not fill with water.

The water end of the pipe was a short length of pipe with a solid coned end, about 1 foot long, having at its end an eye to which was shackled the hauling end of the cable. The cone was intended to cut through obstructions which would otherwise stop it. The pipe itself was the best 6-inch, Allison, upset end, steel pipe. The threads were specials, and were made plus, being on the collars, so that the threading did not weaken the pipe at all. The threads had an extra taper and the ends of the pipe were faced, and were intended to set flush with the end of the next joint. A stout post was set up near the line of the pipe, and a line was taken around the pipe about 20 feet from the end, and a turn taken around the post, so as to snub the pipe as it went into the water.

The cable used in hauling the pipe, made by Roebling's Sons Co., was the best steel wire cable on the market, with a breaking strength of 120 tons. Part of the cable was 1 inch in diameter for the lighter pulls, and the remainder was 1¼ for the heavier pulls.

The cables were joined by coned ends and shackles, and reeled up on the side of the river opposite to where the pipe was ready and a brake arranged on the reel. The end of the cable, with plenty of slack for connecting with the pipe, was put on a barge and made fast by chain grips. The barge was then taken in tow by a tug, and the cable guided across the river in as straight a line as possible, a range being taken which took into account the current, etc. When near the shore, a second tug came alongside the barge and pushed it to the shore. The end of the cable was immediately shackled to the end of the pipe line, and the cable cast loose from the barge and thrown overboard. All was now ready for pulling. The first attempt to take the cable across failed because of some carelessness in the winding of the cable on the reel. The second time the cable was wound, boards were put in lengthwise to the reel so as to give a snug, neat coil, and also to keep the shackles from fouling. The brake was discarded and boards used as a hold-back on the edge of the drum.

When the far end was made fast to the pipe line and everything was



river was considered. The consideration of locomotives was abandoned owing to local conditions. A large derrick boat, with modern machinery was engaged. This boat had a capacity of lifting, on a straight pull, 75 tons. All of the pipe and protecting sleeves were taken across the river to a point near where the pipe was to enter the water. A ditch was dug at the point selected at right angles to the water line, and as this side of the river bed is very steep, no trouble was anticipated from the friction on the bank after the pipe was once started into the water. Fifty feet from the water's edge the sounding showed a depth of 60 feet, while 250 feet out there was a depth of 120 feet. A length of pipe about 250 feet long was then screwed together, each joint being screwed up as tightly as possible, four pairs of extra long and heavy pipe tongs of lathe pattern being used. It was considered extremely important that the threads should be entirely taken up, and that no threads should be crossed; because in hauling on the cable to draw the pipe line across the cable, by untwisting as the strain came, tended to loosen the joints by starting the threads. Each joint was coated on the threads with asphaltum iron paint, for the double purpose of preservation and preventing leaks. Each coupling was inclosed in a split sleeve of cast in readiness, a fall was hitched to the cable with chain grips and hauled taut, acting as a stopper, and the cable was unreeled to the next shackle and unshackled and led into the drum of the hoisting engine of the floating derrick, on whose deck the work was being done. This derrick was securely tied up to the shore and the reel strongly secured to the derrick. A trench about 8 feet long was dug about 250 feet from the shore line and parallel with the water edge, and two large pieces of timber, 8 inch by 16 inch, put into it, and a second ditch dug towards the river and a short cable passed with a round turn around the timber, and the ends clamped with special cable grips. A second short cable was hooked on to the first and taken along the ditch to the water's edge, and a large snatch block shackled to it.

When all was ready the cable was passed through the snatch block as a fair lead to the drum of the windlass and the signal made, "ready to haul," which was answered from the other side, and the haul was then made. When the end of the pipe came near the water's edge, the signal was made, "stop heaving;" the plug end was then removed and the next joints of pipe screwed on in succession, and the plug joint replaced for another haul.

The first hauls were easy, and unless obstructions were met with, offered no difficulty. Some obstructions near the shore on the pipe side gave some trouble, necessitating the use of a luff on the cable. This was hitched on to the cable with a chain-grip and taken to the bitts and a rope taken around the gypsy on the windlass and hauled in. The large sleeves seemed to be the thing which caused the trouble, and the first two or three had apparently cut their way through timber obstructions, the others having followed readily.

The pulls became heavier and heavier as the line entered the water. The cable was then stoppered, and the snatch block taken from the end of the line on the dead-man. The line was shortened in until about 200 feet from the bank of the river, and an extra heavy 22-inch two-sheave block hooked on. A second block with three sheaves (only two sheaves were used in hauling, no heavier pulls being required) was gripped on the cable. A cable was then rove on these large blocks, and the hauling part leading from the fixed block was taken down to the windlass through the snatch block, the position of which had been reversed. The cable was then hauled in. When the luff came two blocks, the large block was hauled back for the new pull by the gypsy.

When the line of pipe was just outside the hull of the derrick, the cable was stoppered, then slacked from the shore side and taken around under the barge, which was done on account of the construction of the wharf and the levee at this point. When all was ready again and the cable gripped for hauling the stopper was eased off and the line of pipe hauled out of the river right through the mud of the bank, and about 15 feet from the water's edge, apparently in excellent condition. About 15 feet of the line was hauled out of the New Orleans side of the river, and it slipped back when the tension was removed from the cable. The work was considered successfully completed at this point.

The cable was taken across and attached to the pipe line at 5 P.M., Saturday, June 28th, 1902. The first haul was made about 6 P.M., and the end of the line came out on the New Orleans side at 10:15 A.M., Monday, June 30th, making the total working time of connecting up and pulling the pipe into the water about 32 hours. No work was done Saturday night after the first pull was made, but was resumed Sunday morning at daylight and continued straight through till the pipe was brought out of the water Monday forenoon. Twenty-one hundred feet of cable reached across the river, and about the same amount of pipe was used.

The point of entering on the Algiers side is about at the continuation of Newton street. On the New Orleans side, the pipe enters the river about 100 feet north of Julia street.

The peculiar shelving formation of the bottom of the river on the New Orleans side is shown by the profile, reaching out 220 feet from shore. At this particular point the current is up stream, the result of an eddy. The neutral line is out about 200 feet. This profile was made showing the bottom of the river at the pipe line and above and below the pipe, gradually diverging from the dock line at *A* until at *E* the soundings above and below the pipe were 20 or 25 feet from the line of the pipe.

One of the conditions of the permit of the Port Commissioners was that the pipes on the New Orleans side should be placed 25 feet below low water at the dock line, and 30 feet on the keel, as this was the site of a proposed dock for ocean steamers. When the work was finally completed the pipe was 10 feet below low water at the dock line, and about 15 feet on the keel, the Board having consented to let it go at that with the specific agreement that the pipe would be lowered when the Company was notified to do so. The low pressure line was partially down in Algiers, the governor station was completed and gas was turned on in the Algiers district early in November, 1902, and consumers were being taken on rapidly. About 10 days or 2 weeks after the gas was on, the Engineers of the Board of Port Commissioners, Messrs. Coleman, Malochee and Villere, notified the Company that the contract was let for the construction of the new dock, and that the lowering of the pipe should be proceeded with at once.

A large sand dredge was secured to pump the earth from beneath the pipe and thus permit the pipe to settle. In order to keep gas on all the time, and yet have a flexible connection, a section of pipe above the water was removed, and the pipe extended up to the dock level, and connection was made with 16 feet of heavy 2-inch boiler hose. This was accomplished in two hours. The dredge was put to work in shore and gradually worked out toward the channel, the work being directed on reports of a diver. This work was continued for three weeks, when we had the pipe all clear to *D*, but it had only settled about 4 feet. The pipe was free and could be swung by hand back and forward, but it would not go down any further. The river had been rising quite rapidly, and the work had to be abandoned for the time until low water. The 2-inch hose has been doing service all the time, and for more than two months past has been entirely submerged in the flood which has been rushing past.

The fractional profile was made from report of diver Schnell, and sounding taken by C. W. Wood, C.E., the latter part of January, 1903. The diver reported the pipe covered with soft mud from the point *A* to about the location *B*, but the trench excavated by the dredge still remained to a great extent and was readily followed. From *B* to *C* the pipe was exposed, and in fact was from 1 to 3 feet clear of the bottom. The distances are only approximate, and are based on soundings and general conditions. The diver reported that at some point between *C* and *D* he found a decided ditch with a rise of 8 or 10 feet, the face of which is very steep, and he is under the impression that this indicates some wreck or other obstruction. These irregularities between *C* and *D* would seem to indicate some obstructions, but when the stage of the river is considered and the fact that, at about the places mentioned the current and eddy meet, it would be difficult to state just what conditions these varying cross currents might produce.

When the pipe was being pulled across the river, and the end was in the neighborhood of *D*, it looked for a while like it would have to remain there, for the full power of the engine with three-fold block and tackle was stalled.

The cable smoked alarmingly and showed signs of sparks on the winding drum. A luff was used on the cable and the obstruction was pulled through. When the end of the pipe was brought on to shore pieces of timber were found wedged in between the bolts, and the sleeve and some of the short ends of the bolts were bent over as though they had been struck several blows with a sledge.

When the dredge boat weighed her stern anchor, which was buried in the neighborhood of *D*, an old hog chain was pulled up evidently from an old wreck. I think, therefore, that the conclusion is perfectly warranted that the pipe is resting on an old wreck somewhere in that locality.

I should state, by way of explanation, that the pipe shown on the profiles is only approximate. The pipe at *A* and *B* is exact, and the soundings for the pipe were made at the time the other soundings were taken. The elevations of the pipe at *C* and *E* were taken just after the completion of the laying of the pipe, and I have reason to believe that at the points *C*, *D* and *E* the pipe is now touching the bottom.

The service in Algiers is now entirely satisfactory. We have in use a combination regulator and governor. The accompanying cards show the pressure at the works, and on the high pressure side of the Algiers governor, and on the low pressure side of the governor. Wet meters cannot be used because the gas is so dry, after being compressed, that it literally drinks the water from a wet meter in a few days.

We have had no trouble from water in the river main since pressure was put on. When the main was first laid and both ends were open it served as an excellent speaking tube, and conversation was held through it.

Mr. Miller, at the close of the paper, said he took it for granted everyone knew that the laying of this main was the scheme of and done under the general direction of Mr. Shelton.

Discussion.

The President—We have heard a very interesting paper detailing a unique experience in providing for the distribution of gas. I should like to have it properly discussed and the new points taken up in connection with the difficulties mentioned by the writer. Mr. Shelton, you are familiar with this work.

Mr. Shelton—Two or three points, I think, might be added to the paper to make the record complete for those who may want to refer to it later. The cost of work, for instance, is always a matter of interest, and this pipe in question I can say, in round numbers, cost $10,000 to put under the river. It is 2,000 feet or over in length, and it cost somewhere around $5 a foot, laid. The pipe was put across the river to avoid building a separate works in Algiers, which has a population of 15,000 or 20,000. They were ripe for gas, and a suitable plant (outside of distributing pipes and meter service) would cost about $25,000 or $30,000 for the present and some future years. This 6-inch wrought iron pipe to conduct gas at high pressure was with the idea that at high pressure it would be able to furnish as much as a million feet of gas across the river. A 6-inch main at high pressure is by no means necessary to conduct the gas which will be used there for some time; but for stability something tangible to handle, it was thought better to use a 6-inch pipe than to come down to a 5, 4 or 3-inch. I want to call special attention to the charts Mr. Miller inserted in his paper showing the steady pressure condition that we find. The pumping plant at the works accumu-

lates and maintains 15, 20 or 30 pounds during the 24 hours, according to the conditions, on the high pressure pipe system. Sometimes the pressure may be 15 pounds, or it may be 30—it more or less follows that range of irregular pressure through the high pressure mains—but no matter what the pressure may be or the fluctuation of intensity on the high side, the governor does practically and substantially perfect work, and the pressure stands at 30-tenths on the far side of the river night and day. A question of particular interest in going under such depth of water was that, with a low pressure pipe, it would be extremely difficult to take care of condensation, but high pressure would operate with less difficulty in deep water, because the tendency of high pressure gas, in the first place, is not to drop any liquor (that having been squeezed out in the works), due to the compression and to the fact that in any release of gas at high pressure the tendency is to absorb and pick up—the reverse of the effect of compression; and we felt that the high pressure pipe being some distance from the works would operate, as a matter of fact, entirely dry, as far as any condensation from the gas is concerned, and in the several months in which the pipe has now been working I think such has been the result. Am I right, Mr. Miller, in saying that not a drop of liquor or moisture has been observed in the pipe, and that the high pressure seems to eliminate the question of drip in the pipe under the river?

Mr. T. D. Miller—That is right.

The President—We would like to hear from Mr. Norris.

Mr. Norris—I would like to ask whether, in the case of the pipe across the river as finally settled, there is now any tension on the pipe at the shore ends? In other words, as the pipe now lies, has it settled to a bearing on the bottom, or does the current tend to pull it away from the banks? I would also like to ask about how much did the pipe bend down stream before coming to a final bearing—*i. e.*, how far did the current carry the middle of the pipe down stream from a straight line between the two points of entry? I cannot say anything of value in the way of a discussion of this paper, but I would like to express my appreciation of the courage of the New Orleans management in undertaking this job, and the engineering skill with which they have solved a most unusual problem under very unusual conditions. I would like to ask Mr. Shelton how they plan to get rid of any accumulation of water in the bottom of this river pipe if, eventually, there should be any accumulation? I appreciate that the gas entering the pipe is unusually dry, but there might be conditions under which this pipe would get trapped by water, and I am sure this is a possibility which he has some plan for handling if the need for it should arise. I suppose any accumulation of water could perhaps be blown out by pressure, the town being in the meantime cut off and run from the expansion of the gas in the mains while the river pipe is being blown out.

Mr. Shelton—This is Mr. Miller's paper. I think he can better answer these questions than I can.

Mr. Goodnow—All people who attempt high pressure, and especially in our western country and around Chicago, feel a great deal of interest in this matter of submerged high pressure pipe, from the very fact that at New Orleans it must be about as difficult a thing that could be brought into use by any company; and, therefore, if this is successful we would feel perfectly safe in attempting such installations under smaller streams. For myself I never had that obstacle to contend with to any great extent, and so cannot speak of any difficulties that might be encountered. I know several small streams that it will be necessary to cross, in our district, but they will be mere brooks compared to the Mississippi river, so I think we can all feel at ease in the matter; that we can accomplish this without any difficulty whatever. I have not heard from Mr. Miller as to whether there was any question of electrolytic action on the pipe at New Orleans. I should think that the ground near the river would form an excellent circuit, if the trolley currents or the wires of the trolley lines were in such position as to come in contact with his pipe line, and whether any method of installation has been adopted to cut this out. We found in our work corrosion of pipe by the current from the trolley lines, and we spent a great deal of effort, some money, and a good deal of worry in trying to find out just how to prevent this trouble. I think it is a question that will be the more serious because of the conductivity of a high pressure pipe, unless some means of insulation can be used to cut up and prevent the accumulation of the trolley current in returning to the power station. The method that seems to be most effectual is by cutting up the current by such insulating at different points as is found desirable from the volume and strength of the current running on the pipe. There are two methods by which this can be accomplished. The trolley people will tell you to bond your pipe to the rail somewhere near the power station, which will make the connection between the wire or the return into the station, and thus prevent action. This is very true at that point, but at other points a sleeve, or valve or joint will be affected by this action all along, and instead of localizing the action at or near the power station or sub-station it will undoubtedly extend the flow, maybe throughout the whole line. We have reached the conclusion that we would rather localize the points of danger than to bond to the rails the return in that way. We have been at some trouble, and consulted several electrical experts in Chicago and Boston, and have worked under their advice. In doing this we adopted the second method instead of bonding to the rails at any point, and that is why I would like to inquire of Mr. Miller if he adopted any arrangement of that kind for the river line or for his entire high pressure system. The question of dry gas within short distance from compressors is confirmed, I think, by all people who have operated high pressure lines. I contributed a wrinkle for Editor Steinwell's department, showing the diagram of a drip located about 500 feet from the compressors. We never found any water to mention beyond this point. Before we put this in it travelled a little farther and we were unable to get it out, but about November or October we adopted the drip, and were then able to eliminate it and found nothing beyond this point. We were not troubled with any water or frost in service pipes, although we had 200 lamp posts on this line. The question of the cost of this line compared with the cost of a low pressure line for conveying gas across the Mississippi would be a small fraction, provided you wished to convey a million feet across the river. It would undoubtedly take a 16-inch pipe, and several times the cost. As to the question of the amount this will convey, I think Mr. Shelton's estimate of one million feet is very low. I know of a plant near Chicago with a 6-inch line 6 miles long, conveying 1,200,000 feet in 24 hours with an initial pressure of 30 pounds, and losing 8 pounds pressure in that distance.

The President—We would like to hear from Mr. Rice.

Mr. Rice—I am greatly interested in this paper because it accomplishes on so magnificent scale what I had attempted on a very small scale, at Norfolk, Va. Across the river from Norfolk is a small town of about 5,000 people. We decided to attempt to supply it by laying a high pressure line under the river. On account of certain local conditions we finally settled on lead pipe, if the same could be accomplished. We laid a lead pipe, between 600 and 700 feet long, with a capacity which figures out about 8,000 feet per hour, and it does better than that. That pipe has been in use a year and is giving perfect satisfaction. The pipe was pulled across the river in half an hour. It was put together on a large barge in about 12 hours' time by one plumber. The joints are stronger than the pipe itself. The pipe was simply laid around on the barge so as to have no kinks. The barge was pulled across the river. As I said, it was laid in abont half an hour's time, coupled up at both ends and completed. At present we are putting about 2,500 feet an hour through it. The pressure is scarcely noticeable; I should say 2½ pounds. It goes into a small holder on the other side of the river, which gives us a reserve in case of accident; but we have not had any accident. The pipe cost us 33.8 cents a foot, and the cost of laying it, was, as you see, purely nominal. The pressure of the pipe is given by the manufacturer as 600 pounds, and as we have a working pressure of 3 pounds, we have a pretty good margin of safety. On the question of drip we have not found any difficulty yet. The gas is perfectly dry and never accumulates any moisture. It seems to easily solve the question of supplying a very small town across a stream of water. I think the river is 34 feet at its deepest point. The current is very swift, probably running there 7 or 8 miles an hour.

Mr. Miller—When the pipe was first laid, at the point where you notice on the profile, between 2,100 and 2,200 feet is the mattress work. When the pipe was finally let into the ground and settled there was a bend in it of about 35°. Right there was a joint and the strain on that joint was too great for it. It broke the cast steel sleeve and pulled the coupling in two. The leak had been going on up to the time the pressure was put on. When pressure was put on it showed gas coming out, but it did not show until we had blown the water out of the pipe. Probably 40 or 50 feet of pipe was filled with water. We put an air compressor on the New Orleans side and ran up the pressure to about 60 pounds, then opened the valve on the Algiers side and let her go. Considerable alluvium went out with the water. Since that time we have had no water at all. To repair, the pipe was cut in shore, a derrick raised it out of the water, the broken coupling was taken off and a new one put on. The others were found perfectly intact. The pipe was then heated inshore from this sleeve until it bent enough to give just the angle we wanted, and then lowered it back into the water. We have had no trouble since. We did provide a large tank on the Algiers side, so that in the case of any accumulation of condensation or water in the pipe

that would be sufficient to resist the flow of gas, the pressure could be run up and the water blown out into the tank. Then it could be drawn from the tank by simply opening the drain pipe and letting the pressure force it out. There is a tank of similar character on the New Orleans side. The pipe enters the tank at one end and leads out at the other so that any condensation coming in there it will drop down in it. There has been little gotten out of this tank. Regarding electrolysis, I have not had any evidence of it on any of the pipes in New Orleans. I have never made an electrical examination, and I doubt very much if we have very much on our pipes. The ground is so constantly saturated with moisture, I believe, from the character of the soil and the amount of moisture that it carries, that it is a pretty good conductor itself. Besides, the power stations of the street car lines are pretty well distributed over the city, so there is no great concentration of current coming to any one section of the town. As far as electrolysis in the river goes, I cannot see how there could be any, as there are no electrical lines connecting the two cities. I think the telephone company has a cable across the river, and besides that the pipe line is the only connection between the two towns; no bridges or anything of that sort of course. I cannot say, and nobody else can say, just how much that pipe swings down stream. It was pulled across at a fearful tension, but of course there was something of a tendency to swing from a vertical plane at the time because of the current. There are places which we know are 5 or 6 feet above the ground, and I have no doubt the mermaids hang their clothes out to dry on that pipe every day. The tension on that pipe would be practically nothing. There is a certain bending moment in some portions of it in the bottom of the river. I think the tendency would be to gradually fill up under the body of that pipe, and finally probably the pipe will be entirely covered. During this high water the up stream current in this eddy, which extends five or six blocks down the river where the ferry landing is, is very erratic. The ferry boat in going across and coming back will encounter an entirely different condition from that which it found on the prior trip. On our high pressure lines at different points we have put in, in a district where there is a large quantity of gas going, a drip pot or drip tanks. We thought we were going to get a good deal of business there, but we didn't. Very little condensation will accumulate. In the combination governor and regulator spoken of, the regulator brings the pressure from 30 or 40 pounds, or whatever the pressure is, to about 8 or 10 ounces. Then the governor brings it from that down to $\frac{8}{16}$ to $\frac{9}{16}$ on the other side. All of our stations are provided with blow-off tanks so that when the gas pressure gets high, or beyond a safe limit, the gas will blow off instead of bursting the leather diaphragms.

The President—Gentlemen, I think we have had a very nice discussion upon the experience of Mr. Miller in New Orleans, and a vote of thanks would be in order.

On motion of the Secretary, a vote of thanks was tendered to Mr. Miller.

The Captain Makes an Explanation.

The President—The next paper on the programme is that on "Low Candle Power Gas," by Capt. Wm. Henry White, of New York.

Capt. White—Mr. President and Gentlemen of the Association: It is quite an unusual situation that obliges me to offer an apology, for I believe I have performed my duties as a member of many Associations. As most of you are aware, after a serious illness I was sent abroad. I have been back in our country scarcely a month. Fully half of that time has been devoted to professional work in the service of one of the larger gas companies. I also found that my office building had passed into the hands of new owners, who are going to tear it down and replace it with another "skyscraper;" therefore, the search for offices was forced upon me which proved to be a time consuming and exasperating job. Feeling that the time had passed when one could come to these meetings with the crude material of a paper stowed away in his head, and over night put it into shape for presentation, and the further fact that the doings of our Associations are now carefully scanned in Europe as well as this country, combined to make me feel that it would not be either fair to the Association or just to myself to appear here with any such sort of line of thought. Therefore I have to apologize for the fact that I have no paper to offer, and I ask you courteously that I may continue this subject until our next meeting, when I certainly will be prepared. I have found in the time that I did have to consider the subject of my proposed paper that, while for years I had been on record, in discussions, as an opponent of extreme high illuminating powers, that the subject had been taken up in Europe, was being very actively discussed there by the ablest minds in our profession, as well as here among ourselves, and I felt that I could not afford to write a paper that I did not think would stand a fair chance of being at least approximately equal to those that have from time to time been contributed to this Association. Under the circumstances I knew I would rather make before you an apology fortified by an explanation than to present a paper which could be justly criticised as incompetent and unworthy of the occasion. I, therefore, feel that I am doing you the best justice in this matter by simply making an apology and asking your consideration. I trust I may have the privilege of holding the subject my own until next year.

The President—We all regret the lack of the Captain's paper, which untoward happening is due to the misfortune of ill health. We will hold him to his promise.

(To be Continued.)

[Concluded from Page 844.]

Report of the Committee Appointed by the Ohio Gas Light Association to Determine Standard Methods of Testing Fuel Gas Appliances.

Independent Water Heaters.—The efficiency of an independent water heater will vary with the rapidity of circulation. The rapidity of circulation in turn depends upon the resistance through the heater and its connecting pipes, and also upon the height of the hot column of water external to the boiler. These conditions tend to increase the efficiency of the heater the lower the resistance through the heater and the lower the heater sets in relation to the boiler.

We cannot say what rise in temperature of the water passing through the heater is most desired, and unless gas companies want to state when purchasing heaters how much rise in temperature they want them to give, it will be necessary to test these heaters under several different conditions. There are reasons why it seems almost impossible to accurately measure the efficiency of a heater when connected up with a boiler and under working conditions. This is due in a measure to the fact that the rapidity of circulation will diminish as a greater portion of the water in the boiler is heated, and another factor of error, which cannot be eliminated and cannot be accurately measured, is the radiation from the boiler. We, therefore, suggest that the heater be connected up with the boiler and supplied with water of a constant temperature and a constant pressure; the connections between the heater and boiler to be made with 1-inch pipe and four 90° turns. The heater is to be placed in relation to the boiler so that the burner of the heater will be 4 feet below the top of the boiler, and thermometers will be inserted in the supply and discharge pipes from the heater, as illustrated in Fig. 6. The admission of water is controlled by stopcock *F*; *E* is the cock in the drain pipe, by which the boiler can be emptied. By means of *A* and *B* the boiler can be disconnected, and the rate of discharge is controlled by *D*.

The heater will be lighted and the consumption of gas regulated to a flow of 10 cubic feet per hour. After this rate of consumption has been maintained for 10 minutes, the rise in temperature of the water will be observed and recorded. The heater will then be disconnected from the boiler by closing stopcocks *A* and *B*, and a test for efficiency made. Open the discharge cock *D* to such an extent that the flow of water will be maintained at that rate, which will give the same rise in temperature which was observed when the heater was connected with the boiler. The efficiency will be stated in per cent., which will be determined by dividing the heat put into the water by the total heat the gas supplied was capable of developing.

The same test will be made with 15, 20, 25 and 30 feet of gas per hour, respectively, or whatever maximum consumption will result from a supply of gas at a pressure of 2 inches of water. The boiler and heater should be drained after each test and new water supplied.

But to put the competitive heaters on a more equal footing, another efficiency test is to be recommended, and in this test the water passing through the heater will be maintained at a rise in temperature of 50° F., by means of a throttling valve on the outlet of the heater. The efficiency of the heater at this rise in temperature will be determined, first, on the consumption of 5 cubic feet of gas per hour, increasing the rate of consumption in increments of 5 feet until the maximum consumption capacity of the heater burner has been reached at a pressure of 2 inches.

Measurement of Losses.—The losses shall be measured in the same way as specified for instantaneous water heaters.

Gas Ranges.

Top Burners.—Sheet copper pans shall be provided with a uniform diameter of approximately 10 inches and a height of 8 inches. Each pan shall be made of No. 26 gauge copper and have a ¼-inch nipple in-

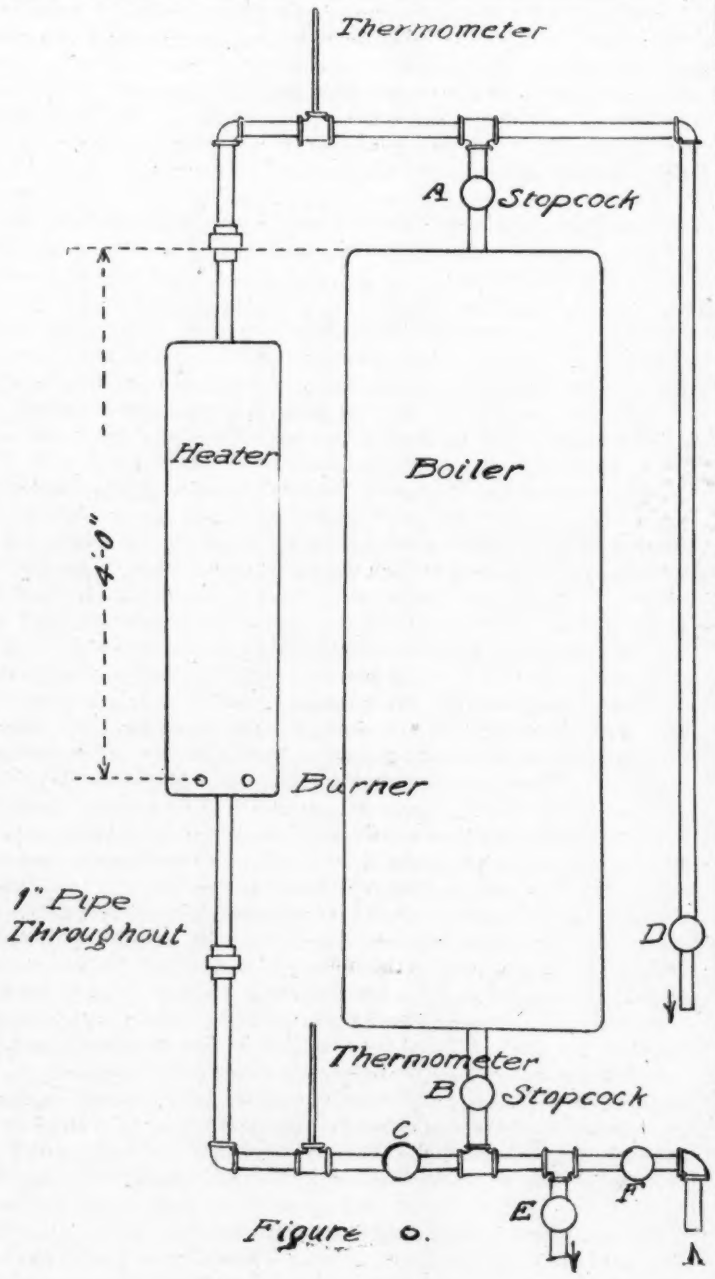


Figure 6.

serted in the side for an overflow, to maintain the water in the pan at a constant depth of 4 inches. The water from the pan over the burner will flow into a small vessel in which a thermometer will be inserted and provided with a suitable overflow, as shown in Fig. 7.

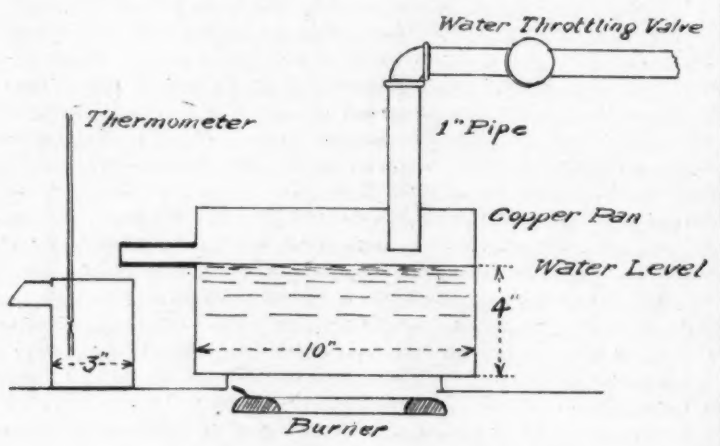


Figure 7

Water will be supplied to the pan over the burner from a source of constant temperature and constant pressure through a suitable throttling valve, by means of which the water flowing through the pan will be maintained at that rate which will give a rise in temperature of 50° F. A test will be made for a flow of 5 feet of gas per hour and for each increment of 2 feet additional flow, until the maximum consumption capacity of the burner is reached at a pressure of 2 inches above the atmosphere. The efficiency of each rate of flow will be stated in per cent., which shall be determined by dividing the heat put in the water by the heat which the gas burned was capable of developing.

The efficiency of the burner may also be determined by noting how much water it will evaporate in a certain time. The pan will be of No. 6 gauge copper, 10 inches in diameter and 8 inches high, with two handles, but without the overflow. Ten pounds of water are put into the pan, and it is set over the burner and the water brought to the boiling point. The pan is then quickly placed on the scales, the weight noted and the pan replaced over the burner. A stop-watch is started at the same time, and the water is allowed to boil for 10 minutes, when the pan is again taken off and qickly weighed and the consumption of gas noted. For a consumption of 20 feet per hour and less the time will be 20 minutes instead of 10. The efficiency will be determined for each rate of flow of gas in the same manner as before.

The total heat put into the water is found by multiplying the weight of water evaporated by 965.7, the latent heat of steam at a barometric pressure of 14.7 pounds. For other atmospheric pressures, consult any tables on the properties of saturated steam.

We recognize that the burner which is apt to give the highest efficiency under this method of measurement is that burner in which the combustion is concentrated as nearly as possible in the center of the pan, and that such a burner would not give the proper distribution of temperature such as is needed for certain kinds of work, but as the greater portion of the work on the top burner of a gas range is boiling, we, therefore, have momentarily neglected the question of equal temperature which is desired for griddle cake baking and similar work.

Losses.—The entire loss will be represented by the sensible heat of the escaping gases, and we, therefore, do not consider their measurement necessary.

Ovens.—Determination of rational methods for determining oven efficiencies is a difficult matter. It is highly important for such work as requires the intermittent use of the oven that this portion of the stove should be constructed with the idea of keeping the thermal capacity of the oven at the lowest point possible to enable this portion of the stove to be heated up as quick as possible. High thermal capacity of the oven racks and walls renders the oven slow to reach baking temperature, and the heat stored in the oven is dissipated without doing useful work after the baking process has been completed.

None of your committee can now say what temperature is required by different characters of work done in the oven. A temperature of 300° F. is required for certain characters of work. We, therefore, recommend the use of a straight thermometer inserted in a hole drilled through the top of the oven and protected from the heat of the gases in the flues by a thimble of metal or asbestos, as illustrated in Fig. 8.

The bulb of the thermometer is to be inserted in the oven to its center

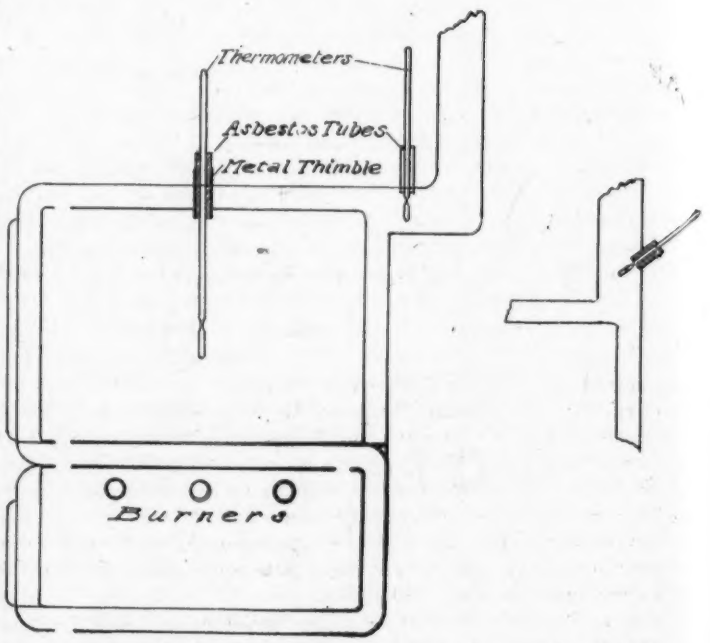


Figure 8

Starting each test with the temperature of the oven at the temperature of the testing room (which is to be maintained as nearly as possible at 60° F.), gas will be supplied and burned at the rate of 5, 10, 15, 20, 25 and 30 cubic feet per hour, or at whatever maximum consumption the burner will do up to 2-inch pressure above atmosphere. The time is then noted which is required to bring the temperature of the oven to 300° F., and the consumption of gas is continued at this rate until the thermometer ceases to indicate an increased temperature. The time required to bring the oven to a temperature of 300° is recorded, and the final maximum temperature at this rate of consumption is also recorded, as also the time required to reach this maximum temperature. Uniformity of temperature throughout the oven can be determined by raising and lowering the thermometer, and uniformity of temperature in other parts of the oven can be determined by inserting a thermometer in this same way from the back and also from one side.

The efficiency of the oven shall be determined by the use of a coil of copper tubing, ½-inch in external diameter and of No. 12 gauge thickness, supported on a special wire stand as nearly as possible in the center of the oven. This coil shall be made on a form as shown in Fig. 9, and shall contain 21 lineal feet of tubing in the oven.

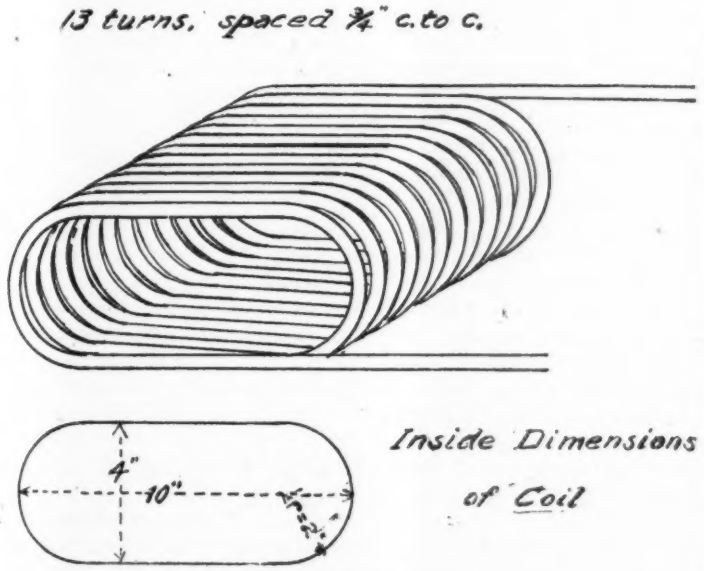
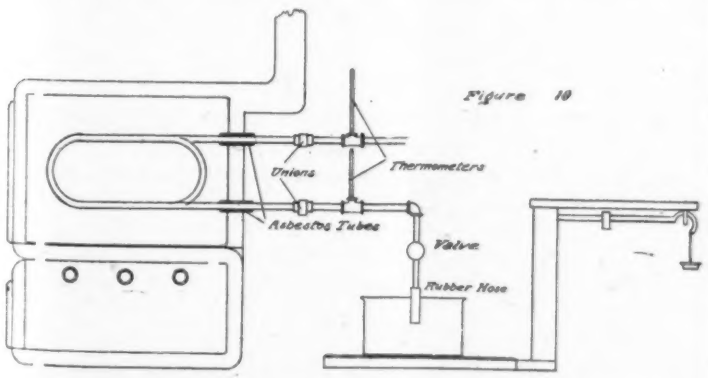


Figure 9.

Through this coil water will be circulated and the rate of flow controlled by a suitable throttling valve on the discharge end of the coil. The ends of this coil will pass through the wall of the oven, as shown in Fig. 10, and where the tube passes through the flue in the wall of the oven it will be protected with a thimble of metal or asbestos.



Consumption will be maintained at 5, 10, 15, 20, 25 and 30 feet of gas per hour, or at whatever maximum rate the oven burners are capable of developing at a 2-inch pressure, and the flow of water will be regulated to that rate which will give a rise in temperature of 50° in passing through the coil. The efficiency of each rate of consumption will be stated in per cent., and shall be determined by dividing the total heat added to the water by the total heat the gas was capable of developing.

Losses.—The losses will be, (A), incomplete combustion; (B), sensible heat for flue gases; and (C), radiation.

Loss A, we believe, will be found to be insignificant. This loss will be determined by analyzing the flue gases, and the extent of this loss will be shown by the quantity of unburnt gas present.

Loss B will be determined by observing the temperature by means of a thermometer at the point indicated in Fig. 8, and from this observed temperature the heat contained in the elementary gas will be computed by multiplying this temperature by the quantity of gas and by its specific heat. The sum of these losses will be the total loss of heat in the flue gases, and this total loss can again be advantageously divided into (1st), necessary heat loss; and (2d), heat loss due to over-ventilation. The first loss can be determined by computing the temperature which would have been carried off in the flue gases, had only enough air been supplied to the burner to support combustion, and this deducted from the total loss will give the amount of loss due to over-ventilation or the air which has been taken through the burner unnecessarily.

Loss C will be difficult to accurately measure. This requires the maintenance of a constant differential temperature within and without the oven. The room can probably be maintained at a fairly constant temperature, but the only positive temperatures readily obtainable for the interior of the oven are those of boiling water and of melting ice. We are unable to find a suitable means of taking advantage of the positive temperature of boiling water, so therefore select that of melting ice.

A pan will be provided, 1 inch high and 10 by 10 inches square. This pan will be set upon a wire support, at a height which will locate a block of ice 8 by 8 by 8 inches in the oven in a position as nearly central as possible. This pan will contain several pins, upon which the block of ice shall be set to keep it in position, and the pan will be supported with one corner slightly below the level of the others to provide for drainage, and from this low corner of the pan a tube will be led through a hole drilled in the door to carry the water of liquefaction into a suitable measuring vessel. The flue of the stove will be stopped with a luted joint, and 20 minutes will be allowed for the rate of radiation to become uniform. At the end of this 20-minute period the catching vessel will be drained, and the time will be noted which is required for the accumulation of 2 pounds of water in this vessel. This can best be done by placing the catching vessel upon a platform scales, so set that the beam will tip when 2 pounds of water are contained in the vessel. Ice requires the supply of 141 B.T.U. per pound to convert it into water, hence the melting of 2 pounds of ice would require 2 by 141 = 282 B.T.U. By computing the area of the inside walls of the oven, the radiation per square inch can be determined. This radiation divided by the difference in temperature of melting ice (32° F.) and the temperature of the air in the room (60° F.) 60 — 32 = 28, will enable the calculation of the radiation at other differential temperatures by multiplying this quotient by any other difference in temperature. The law regarding radiation is that the amount of heat radiated will increase in exact proportion to the increased difference in temperature. This law is not strictly applicable to the work, but is probably sufficiently accurate for our present needs.

Broiler.—The efficiency of the broiler is more difficult of determination than any other portion of the stove. The work of the broiler is largely dependent upon the amount of radiant heat the broiler burner will deliver, and the radiant heat is dependent upon the flame temperature, the conductivity of material immediately above the burner and the reflecting properties of this material. We are not ready to lay down definite specifications for testing the efficiency of the broiler, but we suggest the use of a modified form of the principle used in the absorption radiometer. In this instrument advantage is taken of the fact that heat rays will not pass through water saturated with alum. It is a well known fact that water without alum being added is almost completely impervious to the passage of heat rays. We, therefore, suggest that the use of a pan 3 inches deep of metal construction, except the top which shall be of mica, save for the necessary supporting sash which shall be of metal also. This pan is to have a length and breadth of 1 inch less than the dimensions of the broiler, and shall be arranged with partitions forming channels approximately 2 inches cross, and these partitions will run from alternate sides of the pan to within 2 inches of the opposite tide, as illustrated in Fig. 11.

Water will be fed to this pan through a suitable throttling valve and a tube passing through a hole in the door of the broiler, and from the front corner of this pan the water shall be taken from the pan into a suitable measuring vessel so arranged that the water in the pan will be constantly maintained at a depth of approximately 2 inches. This pan will be so located in the broiler that the top of it will be 2 inches below the lowest portion of the gas flame. The temperature of the water flowing through this pan shall be maintained at a rise in temperature of 50° F. Efficiency shall be stated in per cent., and shall be determined by dividing the total heat added to the water by the total heat the gas was capable of developing.

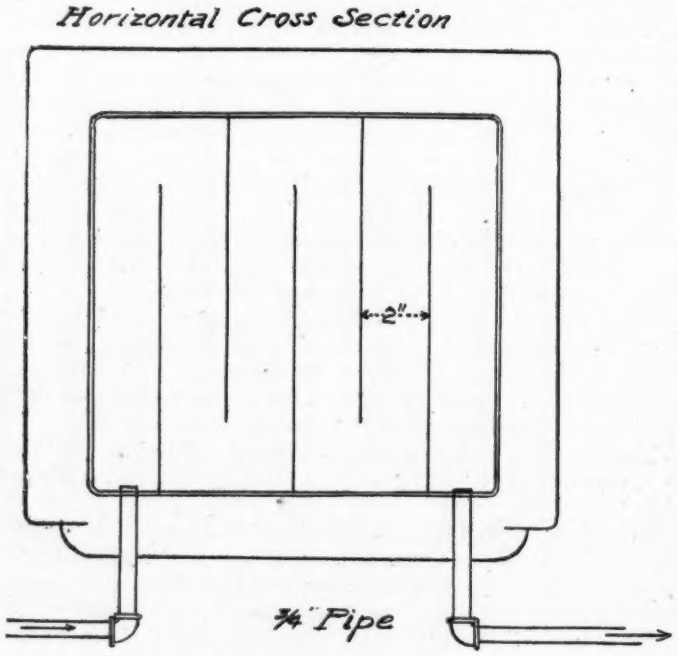
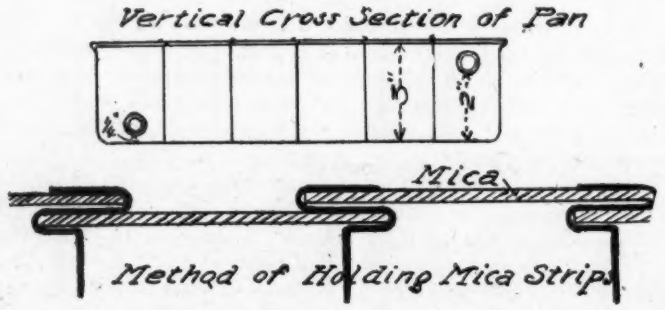


Figure 11



Losses.—The losses will consist of (A), sensible heat in the products of combustion; and (B), radiation.

The first loss is measured in the same way as specified for measuring this loss in the oven.

The radiation loss cannot be very accurately measured, as under actual operating conditions this radiation loss would be somewhat different than the conditions under which it is tested, and we, therefore, suggest taking radiation loss by deduction.

HENRY L. DOHERTY,
F. W. STONE,
JOHN FRANKLIN,
} Committee.

The Comparative Life of Horizontal and Inclined Retorts.[1]

A FEW CRITICISMS OF MR. HERRING'S FIGURES.

The return which Mr. W. R. Herring recently made to the Edinburgh and Leith Gas Commissioners, as to the comparative working life of horizontal and inclined retorts, has aroused considerable interest and (to repeat the expression employed last week) astonishment among gas engineers, who appear to be totally lost for a reason as to why the Edinburgh horizontal retorts have had such a short span of life. In the leaderette on the subject in last week's issue, the remark was made: "We are under the impression that cases will be found that do not altogether bear out Mr. Herring's remarkable testimony as to the superior working life of inclines in comparison with horizontals." Here are a few.

Mr. J. Ferguson Bell, of Derby, contributes the following letter: "Under the 'Technical Record' in the *Journal* last week, you give an account of the life of horizontal retorts at the Edinburgh and Leith Gas Works, which I venture to think is confined to the works named. However, this may be, it certainly does not represent anything at all approaching the normal life of gaseous fired horizontal retorts in most gas works, which varies from 1,000 to 1,200 actual working days, and upwards. In other words, it would appear from the return that horizontal retorts at the works named are renewed after less than 12 months' continuous work, which is an extraordinary short life. It is early yet to premise the relative life of inclined retorts compared with horizontals; but no comparison based on anything less than 1,200 working days will be accepted by most engineers as a standard for the latter. Surely there must be some special circumstances which will account for so short a life as only 354 days at the Edinburgh and 340 days at the Leith works. This is only about half the life of horizontal retorts under the old direct fired system; and, as a rule, this is doubled by modern gaseous fired settings."

Mr. Thomas Berridge, of Leamington, writes: "The average life of the horizontal retort at these works is over 900 days. One really cannot, therefore, understand Mr. Herring's figures of 354 days only."

Mr. C. E. Botley, of Hastings, says: "The last sections of retorts which were renewed here had a life of 850 working days, during which time each retort carbonized upwards of 1,100 tons of coal per 20 feet length."

Mr. Alfred Colson, of Leicester, writes: "Your suggestion that Mr. Herring's communication to the Edinburgh and Leith Gas Commissioners with reference to the above subject will perhaps create astonishment among gas engineers is, I think, likely to prove correct. That, as a standard of comparison as to durability, the life of horizontal rretorts should be taken at 354 days certainly astonishes me. Surely so short a life as that taken by Mr. Herring does not generally obtain in this country. I give my own experience. It is many years since the retorts (all horizontal) at our Aylestone Road works, heated by regenerator furnaces, actually worked less than 1,000 days; generally 200 days before being let down for repairs. At the present time, we have at these works retorts carbonizing and doing excellent service that have already worked from 1,100 to 1,300 days, producing 9,500 cubic feet per mouthpiece, and 11,000 cubic feet per ton of coal. At the Belgrave Gate works there are retorts (smaller than those at Aylestone Road), heated by generator furnaces, that have worked over 1,600 days, and are now producing 7,500 cubic feet per mouthpiece, and 11,000 cubic feet per ton of coal. These same retorts will last at least another 200 days. The life of horizontal retorts, if heated by generator furnaces, I should say is from 1,600 to 1,800 days; if heated by regenerator furnaces, from 1,300 to 1,500 days. Mr. Herring's inclines have run 782 days, but are 'still in working order;' their life has yet to be determined."

Mr. Hanbury Thomas, of Sheffield, says: "Referring to the leaderette in your issue of the 5th inst., the most remarkable feature of the Edinburgh figures appears to be the short life of the horizontals. My Company keep a record of the dates of lighting up and letting down of each bed of retorts; and I find that at our last new works (Grimesthorpe), where we started making gas in November, 1898, with 15 beds of 10's (clay retorts) and West's stoking machinery, the life has been as follows: Of 8 beds renewed last summer, six were in actual use 852 days and two 1,053 days. The remaining 7 beds, which will be renewed this summer, but are still working, have been in use 1,266 days. At our other works, where we have stoking machinery in operation, brick retorts are employed; and there are some still in use which have been at work upwards of 3,000 days."

1. *Journal of Gas Lighting.*

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. E. R. CASE, writing to the JOURNAL from Jersey City, N. J., under date of the 2d inst., says: "I note an item in your issue of June 1st in relation to the leasing of the Essex and Hudson Gas Company, the Hudson County Gas Company and the South Jersey Gas, Electric and Traction Company which was incorrect in so far as it related to the Hudson County Gas Company. As I presume it is your desire to have all your gas news correct, I beg to say that the proposition of the Hudson County Gas Company was not from 3½ per cent. but from 2 to 8 per cent., reaching the maximum rental in 8 years from December 1st, 1901. This leasing proposition also included the Patterson and Passaic Gas and Electric Company, the terms to them being from 1 to 5 per cent. At the stockholders' meeting of the Essex and Hudson Gas Company and the Hudson County Gas Company, held yesterday, the action of the Directors was ratified and approved by unanimous vote of the stock represented, and at the meeting of the Paterson and Passaic Gas and Electric Company to be held to-day, it is expected that the action of the Directors of that Company will also be ratified."

MR. WALTON FORSTALL, writing to us from Philadelphia, under date of the 2d inst., says: "I was much interested in reading Mr. Bullock's experiences with cement joints, as detailed in your issue of May 25th,

but five years of successful experience in the use of cement in joints from 4 inches to 30 inches in size forces me to disagree with the conclusion arrived at by Mr. Bullock; namely, that lead is preferable to cement on the score of leakage. It is undoubtedly true that less care and experience are needed to make a tight lead joint than a tight cement one, but the latter, when well made, is so far superior to the former, both on the score of economy and of tightness, that Mr. Bullock will do well to persevere in cement work until he has overcome his difficulties. From reading his article I would imagine that he was not quite careful enough about his temperatures, and that in back-filling he jarred the joints. It is much safer to tamp around the pipe between the bells before making joints than after making."

MR. J. T. PULLEN has resigned the Superintendency of the gas department of the Alton (Ills.) Railway, Gas and Electric Company, in order to assume the duties of General Manager to the Ottawa (Ills.) Gas Light and Coke Company.

AT the annual meeting of the shareholders in the Consumers Gas Company, of Reading, Pa., the Directors chosen were: Samuel T. Bodine, Wayne McVeagh, Richmond L. Jones, L. T. Custer and Walton Clark.

MR. WILLIAM OLIVER has been retained as Superintendent at Waterloo, by the new owners of the Seneca Falls and Waterloo (N. Y.) Gas Company. Mr. C. F. Robinson has been appointed General Superintendent of the Company. His assistant at Seneca Falls is Mr. F. O. Cheney.

MR. B. S. PEDERSON reports that the new plant at Visalia, Cal., will be completed within the time specified in the contract.

MR. J. J. HENRY, who recently purchased the plant and properties of the Salem (Ore.) Gas Light Company, proposes to double its manufacturing capacity, and, he confidently adds: "I will double its output, too."

A CORRESPONDENT forwards the following from Wilkes-Barre, Pa.: "What is perhaps one of the most interesting opinions of the Supreme Court in a local case has just been received by Prothonotary Jackson. It is the case of saloon keeper Wm. H. Miller vs. the Wilkes-Barre Gas Company, and the judgment is reversed. Facts are as follows: Miller became a tenant of a house and lot in South Wilkes-Barre known as Farr's Hotel. When he took possession the former tenant, when he left the premises, was in arrears on his gas bill $15.73. Miller during his occupancy in the month of November had incurred an additional bill of $9.02. He was willing to pay his own bill but refused to pay the arrears of the tenant who preceded him. After making another effort to collect the old bill, the Gas Company took out the meter and for 11 months Miller was without gas and was compelled to use oil lamps. He then brought suit averring among other things that the Company without any legal cause of justification removed from the hotel the meter, thereby depriving the plaintiff of gas light and damaging him in the amount of $3,000. The defence was that the Company had the right to remove the meter because its charter imposed no obligations upon it to furnish gas to any particular individual; that it had a right to remove the meter in default of payment by the prior tenant; that the plaintiff had shown no sufficient proof of loss sustained by the removal of the meter; and that the plaintiff is not entitled to recover for loss of profits in his business for the taking out of the gas. The Supreme Court takes up the first two averments and decides that the Company is obliged to supply the plaintiff with gas if he desired it, for the taking out of the charter made the Company bound to accommodate all, and that the demand for the back bill was illegal. The principal question passed upon by the Court and the one which caused the reversal of the judgment is that referring to the proof of damages. Considerable space is given to this point, part of which is as follows: 'The verdict was for $2,500 or about $7 per day damages. There was nothing in the case calling for punitive to be made whole. What in money had he actually lost by the wrongful act of defendants, he was entitled to no purely speculative profits. Plaintiff's evidence on this question seems to us somewhat vague, nor is the charge of the Court so clear as to guard the jury from guessing at what ought to have been reasonably certain.' Nor does the learned judge himself seem very sure of his ground, for in his opinion on the motion for a new trial he says: 'I was not satisfied at the trial nor am I now satisfied that the plaintiff's proof of the amount of damages sustained by him was clear and satisfactory, as from the nature of the case ought to have been adduced.' In the charge he submitted the evidence to the jury, saying to them: 'If you should decide that plaintiff is entitled to recover in this case, the thing which has bothered me most, as you evidently have noticed, is the question whether plaintiff has shown such clear specification of damage sustained by him on account of the turning off of his gas, as under the law would warrant me in submitting the question.' The Court it seems might well have been in doubt as to its duty in this particular. The plaintiff himself testified that the greater part of his profits accrued from sales of liquor at the bar; the substitution of lamps for gas burners would only change the kind of light; the customer would not necessarily be deterred from taking his drink because he must now swallow by the light of an oil lamp, whereas he formerly took it by the light of a gas jet. We understand that he might not be able to fix with exactness his loss, but if he could not adduce evidence that would warrant a jury in fixing it to a reasonable certainty, that is his misfortune; it is no reason why a jury should be permitted to guess at the amount. He testifies that while he burned gas his gross receipts except on Saturdays were $20 to $22 per day, and on Saturdays $65; that by lamp light they were about half this; that the profit was 60 per cent. From what he says, obviously, this was a guess on his part, for he says he kept no book whatever; that he never put down his receipts or expenses; that he kept no bank account; that he put in his pocket whatever money came in; could not tell the exact amount taken in any one day of the 11 months or in the month before the meter was taken out. Surely this was not the best evidence he might as a prudent man have had, for he knew immediately after the meter was taken out he would claim damages. He could then with some reasonable certainty have proven the receipts for the first month and his daily accounts would have shown what they were afterwards. Although he knew he would claim that defendant should pay to him a large amount of money, he took no means whatever to preserve evidence to show the justice of his claim. He practically guesses at his receipts, expenses and profits, and this is all the testimony there was on the subject. Surely he bought his liquors from wholesalers and paid for them; their books would show what he bought the month before the meter was removed and what the succeeding 11 months; deducting what he had on hand at the end of that period would show his sales; no evidence of this kind was offered. Another significant fact is that he agreed to pay rent for the premises at the rate of $360 per year when the meter was in; after it was taken out he rented the next year at the rate of $480. This does not indicate a loss of custom. We think there was no sufficient evidence to warrant the jury in assessing plaintiff's supposed loss of profits as damages, and that when the learned judge instructed the jury that they might find for plaintiff on the evidence all damages which he had proven in a clear and satisfactory way was error; for he had not proven in a satisfactory way any loss of profits; his evidence on that point was wholly insufficient and for that reason the judgment is reversed. We will not say that he is entitled to only nominal damages. If his expenses for lighting by lamps was greater, or his payment for services increased, his damages may be more than nominal, but they are not more by any sufficient evidence of loss of profits."

THE Massachusetts Board of Gas and Electric Light Commissioners have authorized the Cambridge Gas Light Company to issue 875 shares of new stock at $200 per share, the proceeds from the same to be applied to the cost of constructing a new gasholder. The Company asked for an issue of 1,000 additional shares at $175 per share, whereas the City Solicitor of Cambridge asked that the issue be restricted to 700 shares at a selling price of $263 per share.

GAS was turned into the mains of the Peoples Gas Company, of Shenandoah, Iowa, the 22d ult. The valve was turned by Mayor Cottrell. General Manager Hayes deserves great credit for the energy displayed by him in the formation of the Company and the construction of its plant.

THE Connecticut Railway and Lighting Company has decided to reduce the selling rate for gas in its Norwalk district to $1.55 per 1,000 gross, with a rebate of 10 cents per 1,000 on all bills paid within 10 days.

PRESS dispatches dated the 2d inst. are to the effect that the Board of Street and Sewer Directors, of Wilmington, Del., have granted permission to the proprietors of the Oxy-Hydrogen Gas Company to lay mains through the streets of that city. This is the concern owned by J. Edward Addicks. Its works were constructed about 12 years ago, but the right to use the streets was denied its backers.

THE Memphis (Tenn.) Consolidated Gas and Electric Company has mortgaged its properties to the Central Trust Company, of New York, as Trustee, in the sum of $5,000,000.

THE authorities of Wheeling, West Va., are considering the advisability of completely rebuilding the municipal gas works.

IT is confidently asserted by a certain financial clique in Cincinnati, that the works and rights of the Cincinnati Gas and Electric Company are to be taken over on a guaranteed dividend leasehold by the United Gas Improvement Company. On the other hand very strong local interests deny the statement, and assert that the control and management will remain in and with Cincinnati capitalists.

A CORRESPONDENT in Albany, N. Y., incloses the following: "The second case against the Municipal Gas Company, of Albany, tried at this term of the Supreme Court, met the same fate as did the first one. It was a non-suit. The case last disposed of was an action brought by William B. Harris against the Company to recover $1,500 for damages sustained by him because of an explosion of illuminating gas which had escaped into the celler beneath his store, 9 South Pearl street, November 11, 1901. It was shown on the trial that the gas had escaped and that such escape had been called to the attention of the Company, but the court held that although the gas was there, the fact that a third person went into the cellar and ignited it, that was the intervening cause of the explosion, and inasmuch as that third person was one over whom the Company had no control, he not being in its employ, therefore the Company was not liable for the injuries sustained and the action could not be maintained. A non-suit was ordered."

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JUNE 8, 1903.

The Market for Gas Securities.

The speculators who operate for the short side are seemingly in complete domination of the market, and their march to profit elicits no defense from those who have been enlisted on the long side.

Consolidated closed to-day (Friday) at 194 to 195, and the shrinkage in values was brought about through comparatively meager selling. Apparently there is no lack of money on call at 5½ per cent., so there should be no good reason to deter speculators from dealing in a security the net carrying charges for which should not exceed, at the 5½ per cent. rate, 1½ per cent. per annum. However, speculators and speculation are not always governed by reasonableness. The queerest thing in connection with the whole matter is the strength of city gas bonds.

Brooklyn Union is quoted at 202 to 206; figures that are absurdly cheap; just about 90 points below the real worth of the shares.

Bay State is somewhere in the neighborhood of one-quarter of 1 per cent., and the Addicks press has stopped work. The quotation does not justify the purchase of ink.

Consolidated, of Baltimore, is unaccountably weak, and a like remark applies to Peoples, of Chicago.

Everything on the gas list is a purchase at the market of to-day.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 8.

☞All communications will receive particular attention.

☞The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	194	195
Central Union, Bonds, 5's	3,000,000	1,000	109	111
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	300	310
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.				
Bonds, 5's	11,000,000	1,000	108¾	109
Northern Union, Bonds, 5's	1,250,000	1,000	104	107
New York and East River				
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	.	109	111
Standard	5,000,000	100	131	..
Preferred	5,000,000	100	152½	..
Bonds, 1st Mortgage, 5's	1,500,000	1,000	115½	118
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	202	206
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	¼	⅜
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	7	10
" " Bonds, 5's	5,250,000	1,000	73	76
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Central, San Francisco	000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	98½	99
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	101	101½
Columbus (O.) Gas Lt. & Heating Co	1,682,700	100	88¾	89¼
Preferred	3,026,500	100	107½	109
Consumers, Jersey City Bonds	600,000	1,000	100	102
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	60	60¼
Mortgage, 6's	3,600,000	..	..	115
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	85	87
Consolidated G. & E. Co.'s. Little Falls, N.Y.	90,000	100		100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	77	79
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	70	80
" Bonds, 6's	2,650,000	..	102	104
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	92½	..
Preferred	2,500,000	100	97½	..
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	130	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	184¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¼
New Haven	1,000,000	25	300	325
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	.
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	98½	99
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	51¼	52
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	95	90¼
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	2,465,000	1,000	92	94
Syracuse, N. Y.	1,975,000	100	42	45
Bonds	2,047,000	1,000	98½	99½
Washington, D. C	2,600,000	20	437	440
First mortgage 6's	600,000	..	..	..
Western, Milwaukee, Bonds, 5's	4,000,000	..	109½	110
Wilmington, Del.	600,000	50	232	..

Advertisers' Index.

GAS ENGINEERS. Page

A. E. Boardman, Brevard, N. C. 912
Baxter & Young, Detroit, Mich. 912
David Leavitt Hough, New York City. 912
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 904
Frank D. Moses, Trenton, N. J. 899
Fred. Bredel Co., Milwaukee, Wis. 900
Geo. R. Rowland, New York City. 902
Humphreys & Glasgow, New York City. 913
Kerr Murray Mfg. Co., Fort Wayne, Ind. 912
The Gas Machinery Co., Cleveland, O. 899
The Jeffrey Manufacturing Co., Columbus, O. 896
The Western Gas Construction Co., Fort Wayne, Ind. 880
United Gas Improvement Co., Philadelphia, Pa. 917
Wm. Henry White, New York City. 915

GAS WORKS APPARATUS AND CONSTRUCTION.

A. E. Boardman, Brevard, N. C. 912
Bartlett, Hayward & Co., Baltimore, Md. 913
Baxter & Young, Detroit, Mich. 912
Christopher Cunningham, Brooklyn, N.Y. 909
Connelly Iron Sponge and Governor Co., New York City 883
Continental Iron Works, Brooklyn, N. Y. 914
Cruse-Kemper Co., Philadelphia, Pa. 896
Davis and Farnum Mfg. Co., Waltham, Mass. 912
Delly & Fowler, Philadelphia, Pa. 916
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 904
Frank D. Moses, Trenton, N. J. 899
Fred. Bredel Co., Milwaukee, Wis. 900
G. Shepard Page's Sons, New York City. 912
Humphreys & Glasgow, New York City. 913
Isbell-Porter Company, New York City. 914
Kerr Murray Mfg. Co., Fort Wayne, Ind. 912
Lloyd Construction Co., Detroit, Mich. 902
Logan Iron Works, Brooklyn, N. Y. 916
Quintard Iron Works, New York City. 913
R. D. Wood & Co., Philadelphia, Pa. 914
Riter-Conley Mfg. Co., Pittsburg, Pa. 915
Stacey Mfg. Co., Cincinnati, O. 915
The Connersville Blower Company, Connersville, Ind. 917
The Gas Machinery Co., Cleveland, O. 899
The Jeffrey Manufacturing Co., Columbus, O. 896
The Western Gas Construction Co., Fort Wayne, Ind. 880
United Gas Improvement Co., Philadelphia, Pa. 907

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md. 913
B. E. Chollar, St. Louis, Mo. 902
Economical Gas Apparatus Construct'n Co, Toronto, Ont. 914
Humphreys & Glasgow, New York City. 918
The Gas Machinery Co., Cleveland, O. 899
The Western Gas Construction Co., Fort Wayne, Ind. 880
United Gas Improvement Co., Philadelphia, Pa. 907

SCRUBBERS AND CONDENSERS.

Continental Iron Works, Brooklyn, N.Y. 914
Kerr Murray Mfg. Co., Fort Wayne, Ind. 912
Logan Iron Works, Brooklyn, N. Y. 916
R. D. Wood & Co., Philadelphia, Pa. 914
Riter-Conley Mfg. Co., Pittsburg, Pa. 915
Stacey Mfg. Co., Cincinnati, O. 915
The Gas Machinery Co., Cleveland, O. 899
The Western Gas Construction Co., Fort Wayne, Ind. 880

PRODUCER POWER PLANTS.

R. D. Wood & Co., Philadelphia, Pa. 914

TAR AND CARBONIC ACID EXTRACTOR.

Stacey Mfg. Co., Cincinnati, O..... 915
The Gas Machinery Co., Cleveland, O..... 899
The Western Gas Construction Co., Fort Wayne, Ind... 880

AMMONIA CONCENTRATORS.

Michigan Ammonia Works, Detroit, Mich..... 896
The Gas Machinery Co., Cleveland, O..... 899
The Western Gas Construction Co., Fort Wayne, Ind... 880

GAS METERS.

American Meter Co., New York and Philadelphia..... 919
Detroit Meter Company, Detroit, Mich..... 919
D. McDonald & Co., Albany, N.Y..... 917
Helme & McIlhenny, Philadelphia, Pa..... 919
John J. Griffin & Co., Philadelphia, Pa..... 920
Keystone Meter Co., Royersford, Pa..... 918
Maryland Meter and Mfg. Co., Baltimore, Md..... 918
Metric Metal Co., Erie, Pa..... 919
Nathaniel Tufts Meter Co., Boston, Mass..... 918

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia..... 919
D. McDonald & Co., Albany, N. Y..... 917
Helme & McIlhenny, Philadelphia, Pa..... 919
John J. Griffin & Co., Philadelphia, Pa..... 920
Keystone Meter Co., Royersford, Pa..... 918
Nathaniel Tufts Meter Co., Boston, Mass..... 918

PREPAYMENT METER ATTACHMENTS.

Reeves Mfg. Co., New Haven, Conn..... 900

GAS AND WATER PIPES.

Charles Millar & Son Co., Utica, N. Y..... 904
Christopher Cunningham, Brooklyn, N.Y..... 909
Donaldson Iron Co., Emaus, Pa..... 904
M. J. Drummond & Co., New York City..... 904
R. D. Wood & Co., Philadelphia, Pa..... 914
Warren Foundry and Machine Co., New York City..... 904

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila.. 910
Perkins & Co., New York City..... 910
Westmoreland Coal Co., Philadelphia, Pa..... 911

SPECIALTIES FOR OIL AND PIPE LINES.

S. R. Dresser, Bradford, Pa..... 901

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., N.Y. City..... 904

GAS TAPPING MACHINES.

George Light, Dayton, O.. 904
H. Mueller Manufacturing Company, Decatur, Ills..... 901

CANNEL COALS.

Perkins & Co., New York City..... 910

STOKING MACHINERY.

G. A. Bronder, New York City..... 909

AUTOMATIC WEIGHING MACHINERY.

Richardson Scale Co., New York City..... 900

CONVEYORS.

C. W. Hunt Company, New York City..... 901
G. A. Bronder, New York City..... 909
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 912
The Gas Machinery Co., Cleveland, O..... 899
The Jeffrey Manufacturing Co., Columbus, O..... 896
The Link-Belt Machinery Co., Chicago, Ills..... 921
The Western Gas Construction Co., Fort Wayne, Ind... 880

CHARGING BARROWS & COAL WAGONS.

Kerr Murray Mfg. Co., Fort Wayne, Ind..... 912
Stacey Mfg. Co., Cincinnati, O..... 915

GAS ENRICHERS.

Gulf Refining Co., Pittsburg, Pa..... 910
Standard Oil Co., New York City..... 911
The Sun Oil Co., Pittsburg, Pa..... 911

COKE CRUSHERS.

C. M. Keller, Columbus, Ind..... 911
The Jeffrey Manufacturing Co., Columbus, O..... 896

STEAM BLOWER FOR BURNING BREEZE.

The Connersville Blower Company, Connersville, Ind... 917

ECONOMIZERS.

Green Fuel Economizer Co., Matteawan, N.Y..... 902

GAS GAUGES.

The Bristol Co., Waterbury, Conn..... 896

GAS GOVERNORS.

Connelly Iron Sponge and Governor Co., New York City 863
Isbell-Porter Co., New York City..... 914
R. D. Wood & Co., Philadelphia, Pa..... 914

CEMENTS.

C. L. Gerould, Galesburg, Ills..... 908

RETORTS AND FIREBRICKS.

Adam Weber Sons, New York City..... 908
Baltimore Retort and Firebrick Co., Baltimore, Md..... 908
Brooklyn Firebrick Works, Brooklyn, N. Y..... 908
Henry Maurer & Son, New York City..... 908
James Gardner, Jr., Co., Pittsburg, Pa..... 908
J. H. Gautier & Co., Jersey City, N. J..... 908
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 908
Missouri Firebrick Co., St. Louis, Mo..... 908
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 897
The Kreischer Brick Mfg. Co., New York City..... 908

INCLINED RETORTS.

Adam Weber Sons (Graham, Morton [England] System) 898
Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 863

VERTICAL S'S.

Adam Weber Sons (Oscar B. Weber's Construction)..... 908
Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 863

REGENERATIVE FURNACES.

Adam Weber Sons, New York City..... 908
Bartlett, Hayward & Co., Baltimore, Md..... 913
Fred. Bredel Co., Milwaukee, Wis..... 900
J. H. Gautier & Co., Jersey City, N.J..... 908
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 908
Missouri Firebrick Co., St. Louis, Mo..... 908
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 897

SELF-SEALING MOUTHPIECE DOORS.

Continental Iron Works, Brooklyn, N.Y..... 914
Isbell-Porter Co., New York City..... 914
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 912
Logan Iron Works, Brooklyn, N.Y..... 916
R. D. Wood & Co., Philadelphia, Pa..... 914
Stacey Mfg. Co., Cincinnati, O..... 915
The Gas Machinery Co., Cleveland, O..... 899
The Western Gas Construction Co., Fort Wayne, Ind... 880

CHIMNEY CONSTRUCTION.

Adam Weber Sons, New York City..... 908

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Welsbach Company, Gloucester, N. J..... 906

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STREET LAMPS.

Thos. T. W. Miner, New York City..... 901
Welsbach Street Lighting Co., New York and Phila.... 906

PURIFIERS.

Connelly Iron Sponge and Governor Co., New York City 863
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 912
R. D. Wood & Co., Philadelphia, Pa..... 914
Stacey Mfg. Co., Cincinnati, O..... 915
The Western Gas Construction Co., Fort Wayne, Ind... 850

PURIFYING MATERIALS.

Connelly Iron Sponge and Governor Co., New York City 863

VALVES.

Continental Iron Works, Brooklyn, N. Y..... 914
Isbell-Porter Co., NewYork City..... 914
Kerr Murray Mfg. Co., Fort Wayne, Ind 912
Ludlow Valve Manufacturing Co., Troy, N.Y..... 901
R. D. Wood & Co., Philadelphia, Pa..... 914
Stacey Mfg Co., Cincinnati, O..... 915
The P. H. & F. M. Roots Co., Connersville, Ind..... 903
The Western Gas Construction Co., FortWayne, Ind.... 880

EXHAUSTERS.

Connelly Iron Sponge and Governor Co., New York City 863
Isbell-Porter Company, New York City..... 914
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 912
The Connersville Blower Company, Connersville, Ind... 913
The P. H. & F. M. Roots Co., Connersville, Ind..... 903

ELECTRICAL APPARATUS.

Wm. Henry White, New York City..... 915

PURIFIER SCREENS.

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GAS STOVES.

American Meter Co., New York and Philadelphia..... 905
Keystone Meter Co., Royersford, Pa..... 918
Maryland Meter and Manufacturing Co., Baltimore, Md 918
Nathaniel Tufts Meter Co., Boston Mass.....*..... 918

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J. P. Whittier, Brooklyn, N.Y..... 902

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md..... 913
Continental Iron Works, Brooklyn, N.Y..... 914
Cruse-Kemper Co., Philadelphia, Pa..... 896
Davis & Farnum Mfg. Co., Waltham, Mass..... 912
Deily & Fowler, Philadelphia, Pa..... 916
Kerr Murray Mfg. Co., FortWayne, Ind..... 912
Logan Iron Works, Brooklyn, N Y..... 916
R. D. Wood & Co., Philadelphia, Pa..... 914
Riter-Conley Mfg. Co., Pittsburg, Pa. 915
Stacey Mfg. Co., Cincinnati, O..... 915

STORAGE TANKS.

Christopher Cunningham, Brooklyn, N.Y..... 909
Stacey Mfg. Co., Cincinnati, O..... 915

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PATENTS, TRADE-MARKS, COPYRIGHTS.

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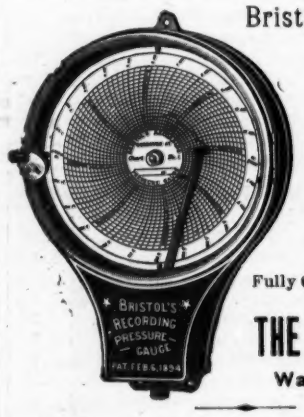
BOOKS, ETC.

Coal Tar and Ammonia..... 900
Gas Analyst's Manual 916
Field's Analysis, 1901..... 918
Gas Flow Computers..... 911
Excerpts from Reports of Gas Commissioners..... 919
Directory of Gas Companies..... 915
Gas Engineer's Laboratory Handbook..... 914
Gas Engineer's Pocket-Book..... 898
Poole on Fuels 911
Practical Handbook on Gas Engines 896
Binders..... 911



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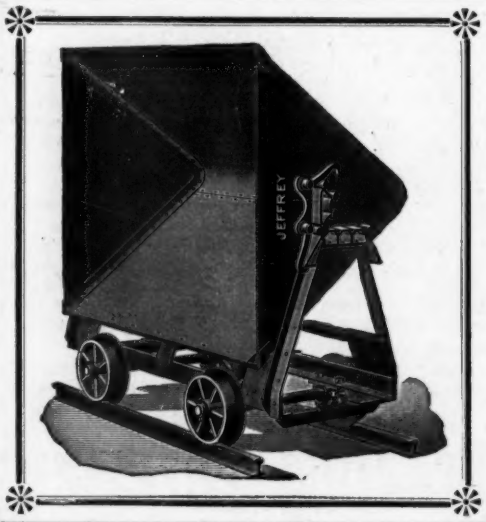

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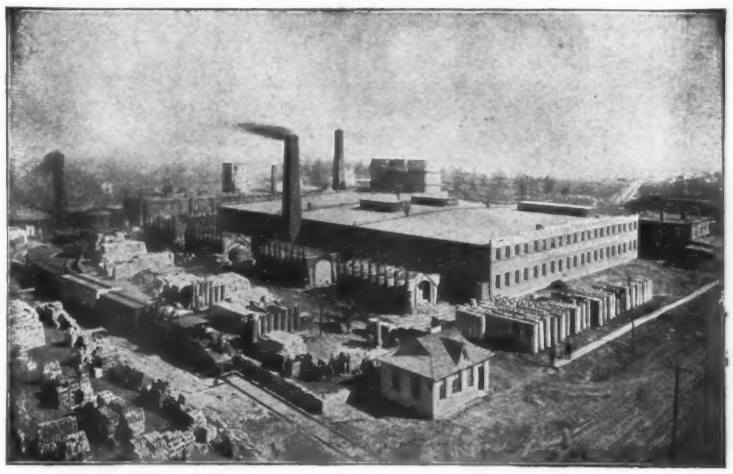

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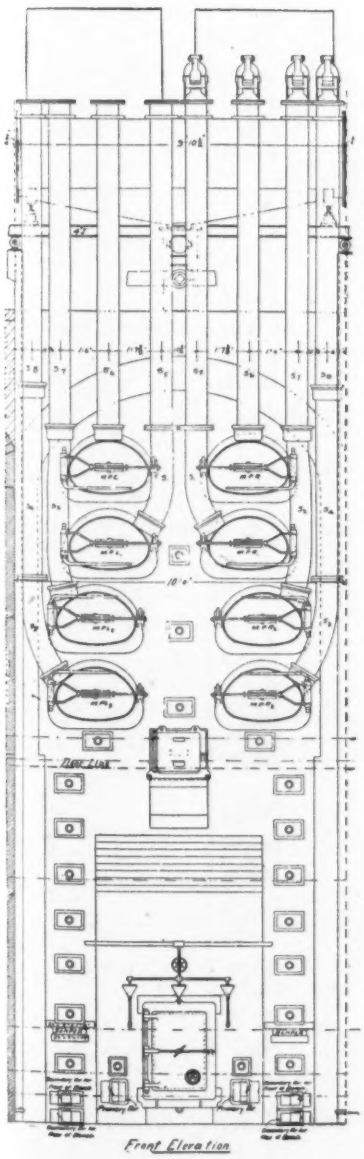

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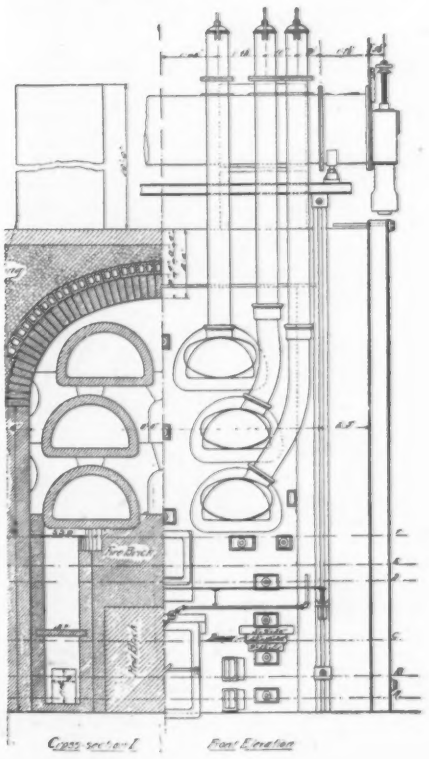

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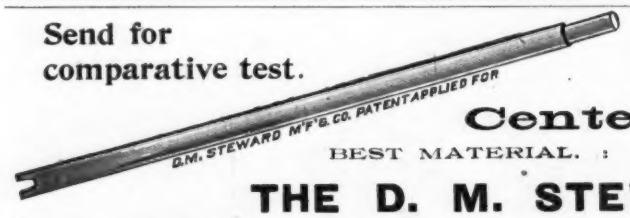

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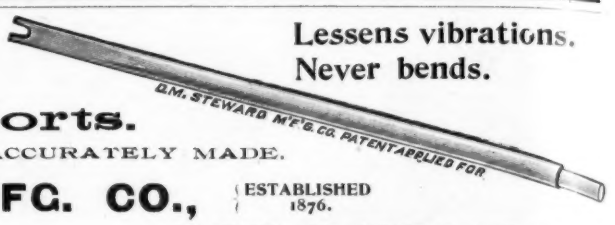

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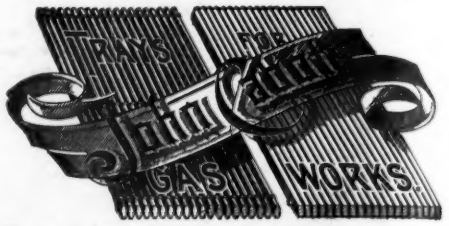

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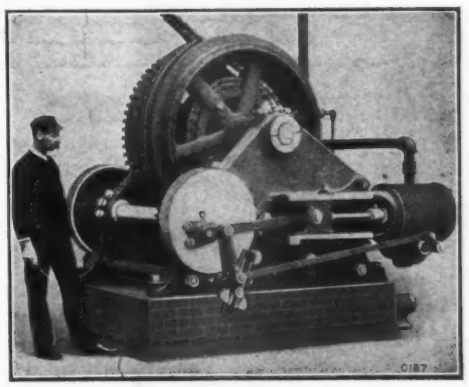

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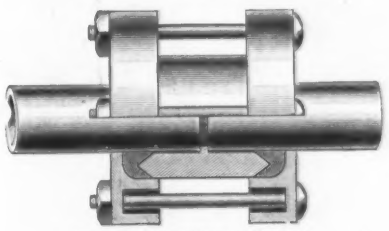

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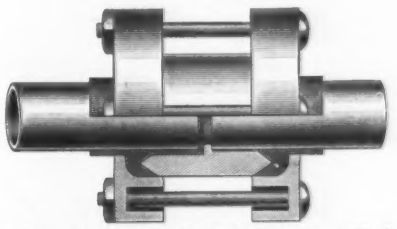

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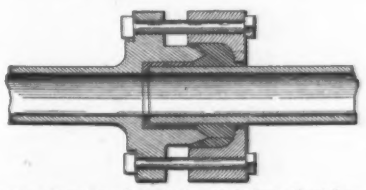

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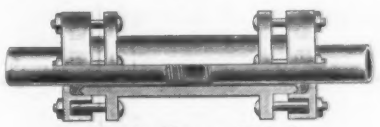

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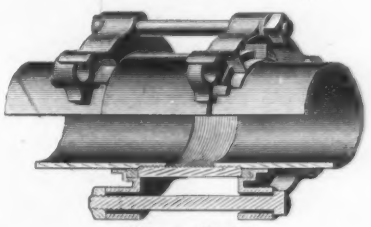

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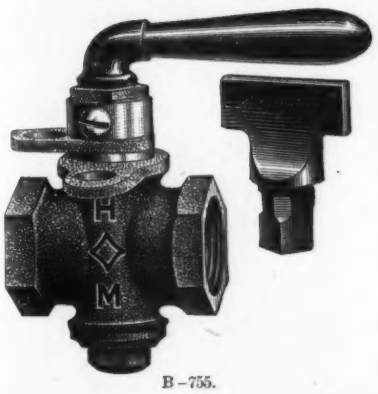

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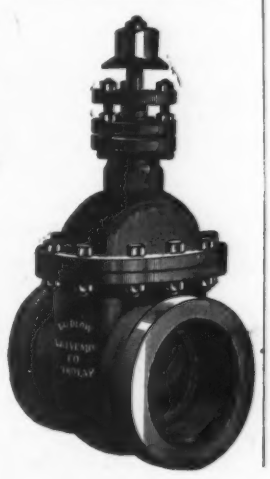

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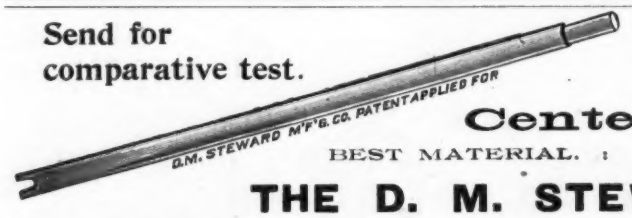

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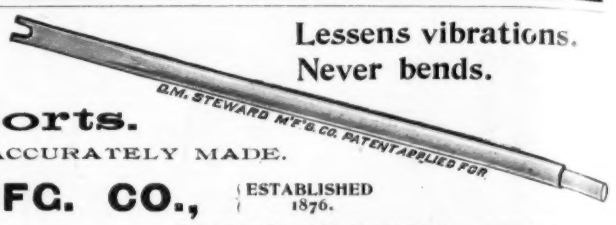

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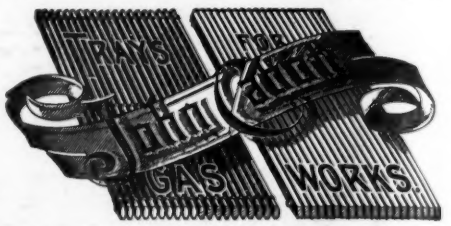

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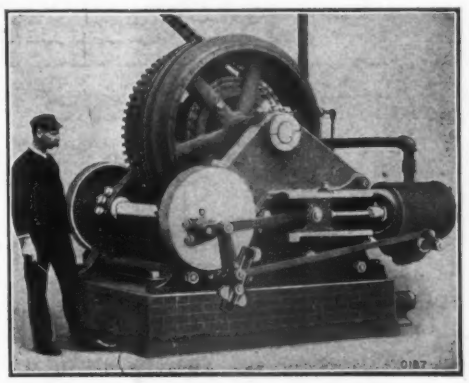

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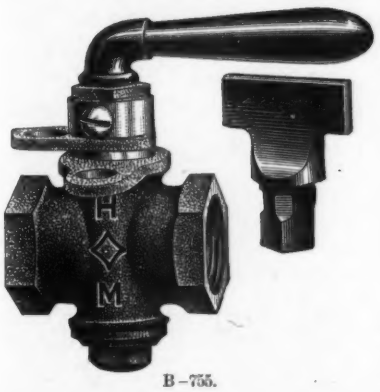

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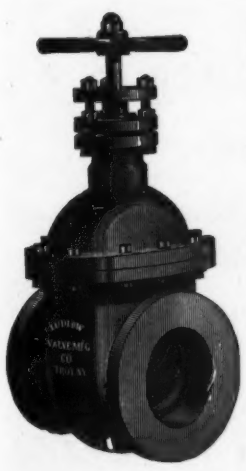

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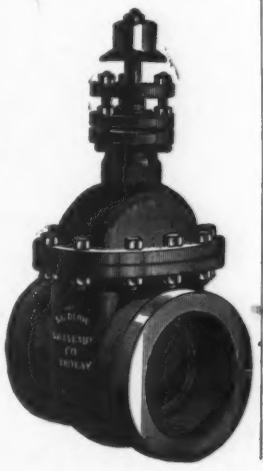

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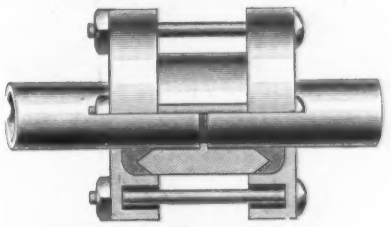

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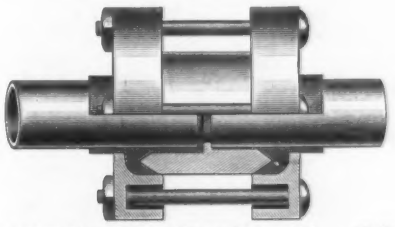

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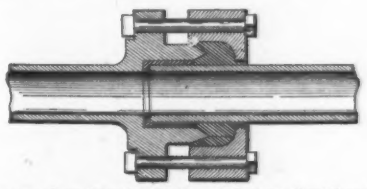

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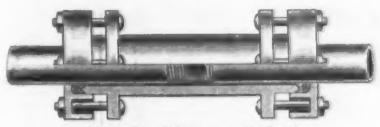

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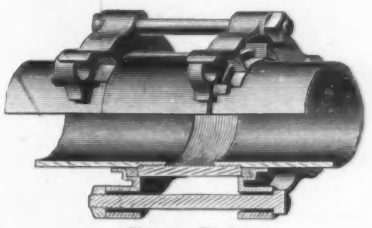

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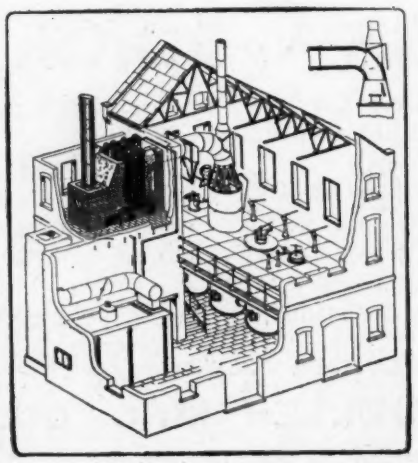

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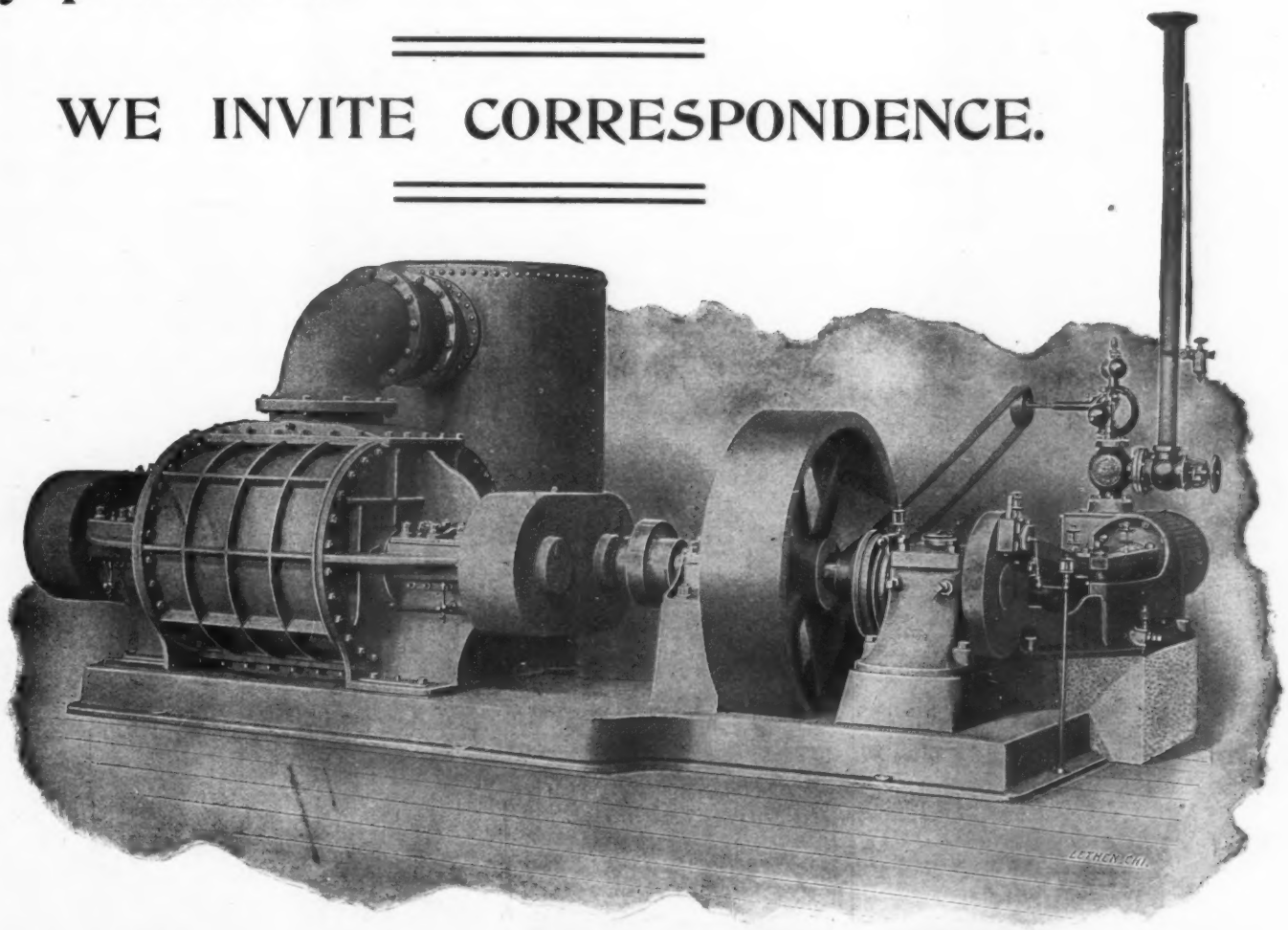

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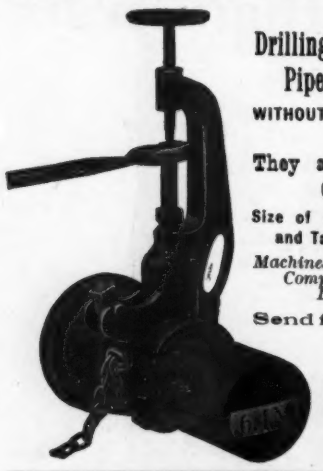

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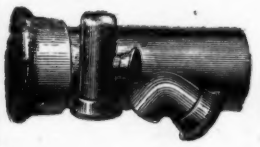

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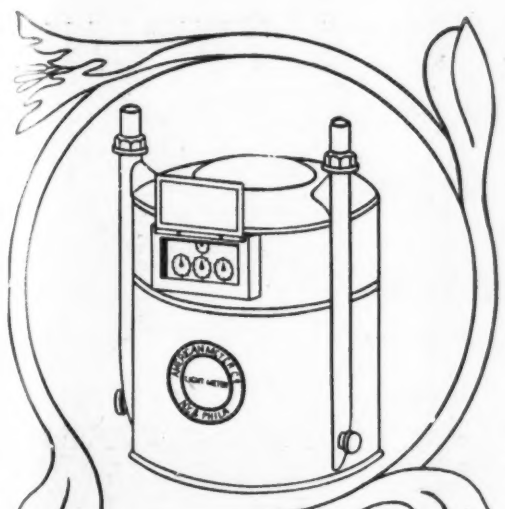
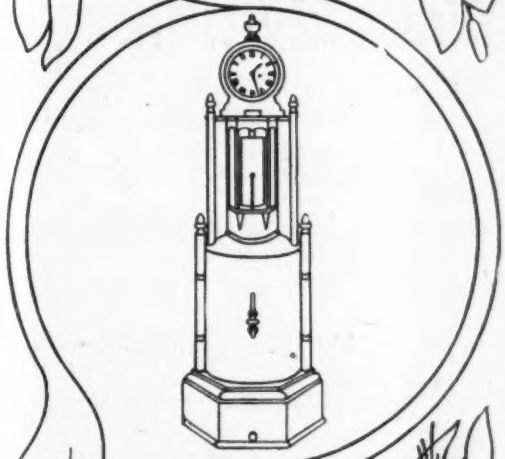
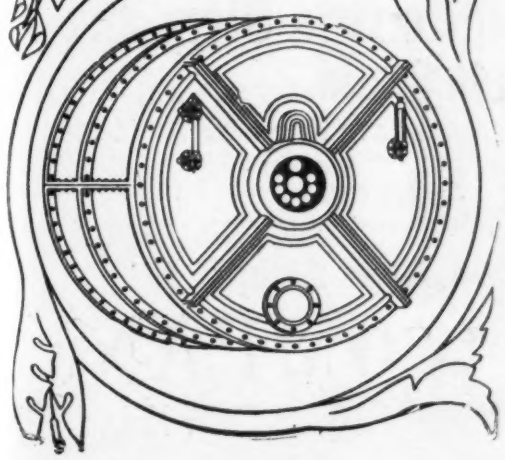






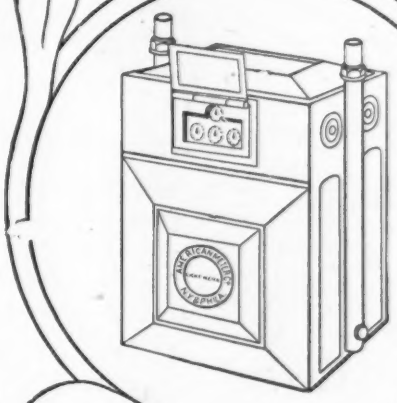
PUBLIC LIGHTING TABLE.

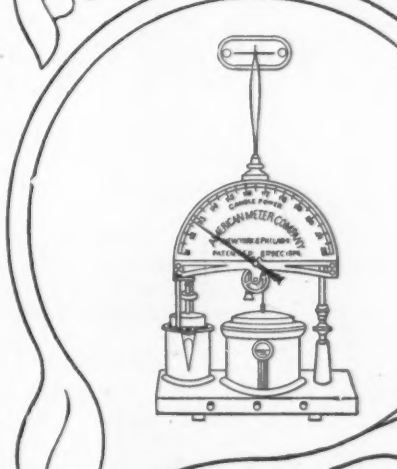
JUNE, 1903.

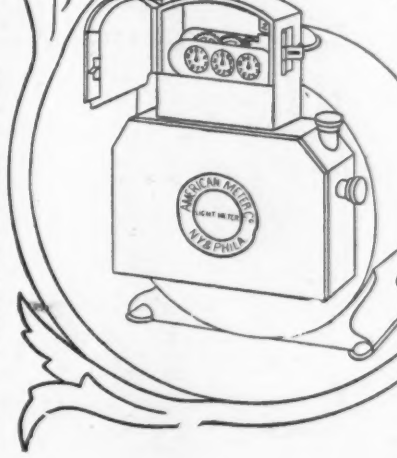
Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Mon.	1	11.10 PM	3.30 AM	7.15	3.15
Tue.	2	11.40 FQ	3.30	7.15	3.15
Wed.	3	12.20 AM	3.30	7.15	3.15
Thu.	4	12.50	3.30	7.25	3.15
Fri.	5	1.30	3.30	7.25	3.15
Sat.	6	2.00	3.30	7.25	3.15
Sun.	7	2.40	3.30	7.25	3.15
Mon.	8	No L.	No L.	7.25	3.15
Tue.	9	No L. FM	No L.	7.25	3.15
Wed.	10	No L.	No L.	7.25	3.15
Thu.	11	8.00 PM	9.30 PM	7.25	3.15
Fri.	12	8 00	10.20	7.25	3.15
Sat.	13	8.00	10.50	7.25	3.15
Sun.	14	8.00	11.30	7.25	3.15
Mon.	15	8.00	12.00	7.25	3.15
Tue.	16	8.00	12.30 AM	7.25	3.15
Wed.	17	8.00 LQ	1.00	7.25	3.15
Thu.	18	8.00	1.30	7.20	3 15
Fri.	19	8.00	2.00	7.30	3.15
Sat.	20	8.00	2.40	7.30	3.15
Sun.	21	8.00	3.30	7.30	3.15
Mon.	22	8.00	3.30	7.30	3.15
Tue.	23	8.00	3.30	7.30	3.15
Wed.	24	8.00 NM	3.30	7.30	3.15
Thu.	25	8.00	3.30	7.30	3.15
Fri.	26	8.00	3.30	7.30	3.15
Sat.	27	8.00	3.30	7.30	3.15
Sun.	28	8.00	3.30	7.30	3.15
Mon.	29	9.50	3.30	7.30	3.15
Tue.	30	10.20	3.30	7.30	3.15

TOTAL HOURS LIGHTING DURING 1903.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	245.00	January	423.20
February	192.00	February	355.25
Mareh	201.00	March	355.35
April	167.20	April	298.50
May	152.00	May	264.50
June	131.00	June	234.25
July	140.40	July	243.45
August	156.20	August	280.25
September	171.20	September	321.15
October	198.20	October	374.30
November	216.30	November	401.40
December	232.10	December	433.45
Total, yr.	2203.40	Total, yr.	3987.45







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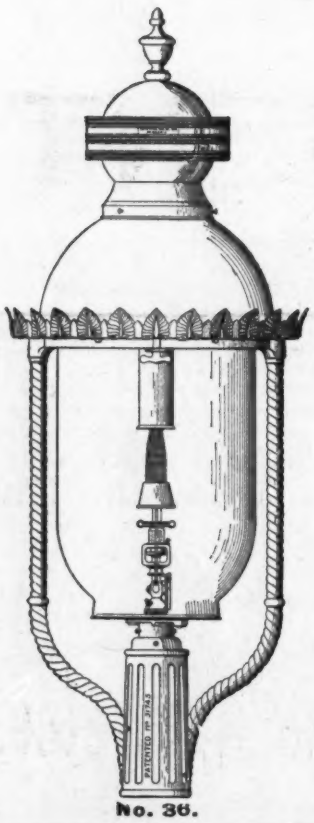
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3. The greatest amount of candle power with least consumption of gas.
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5. A pilot light that consumes but 1 foot of gas in 24 hours. Costs $\frac{1}{10}$ of a cent a day.

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Belmar, N. J.	Indianapolis, Ind.	Oklahoma City, O. T.
Blue Island, Ills.	Jersey City, N. J.	Oneonta, N. Y.
Boonton, N. J.	Laconia, N. H.	Plainfield, N. J.
Brooklyn, N. Y.	Lakewood, N. J.	Portland, Me.
Carlisle, Pa.	La-Salle-Peru, Ills.	Pottsville, Pa.
Champaign, Ills.	Martinsville, Ind.	Scranton, Pa.
Coney Island, N. Y.	Memphis, Tenn.	South Brooklyn, N. Y.
Dallas, Tex.	Newark, N. J.	Suffern, N. Y.
Danville, Ills.	New Brunswick, N. J.	Swedesboro, N. J.
Des Moines, Ia.	New London, Conn.	Syracuse, N. Y.
Evanston, Ills.	New Orleans, La.	Washington, N. C.
Evansville, Ind.	Norfolk, Va.	Woonsocket, R. I.

TOTAL SETS, 1902, ... 51
TOTAL DAILY CAPACITY, 1902, . . 32,825,000 cubic feet.
TOTAL SETS TO DATE, ... 447
TOTAL DAILY CAPACITY, ... 299,670,000 cubic feet.

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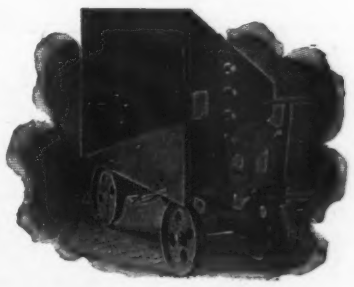

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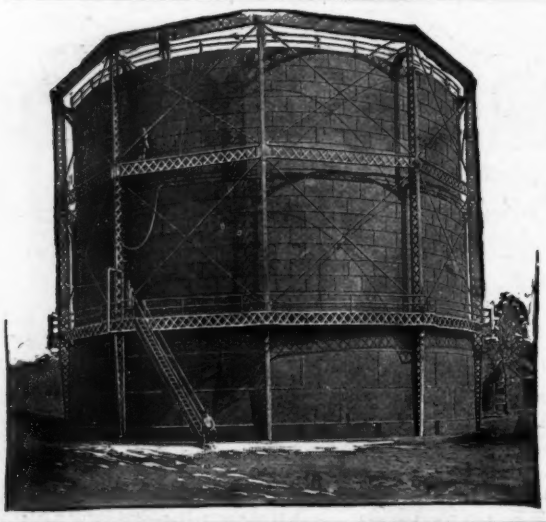

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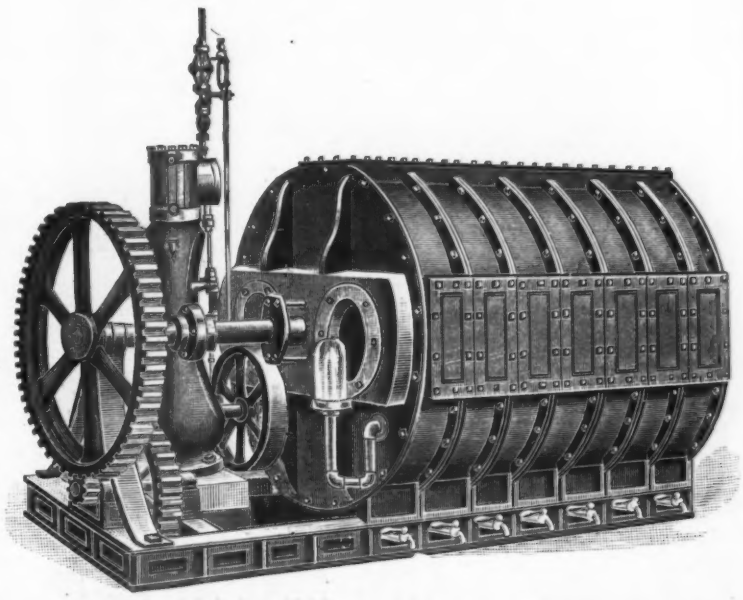

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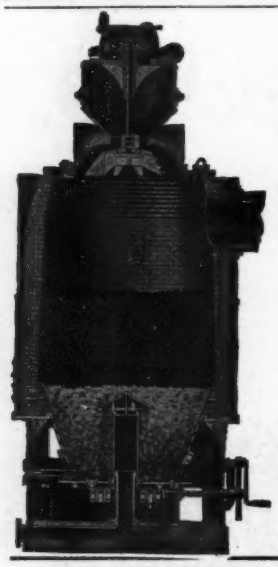

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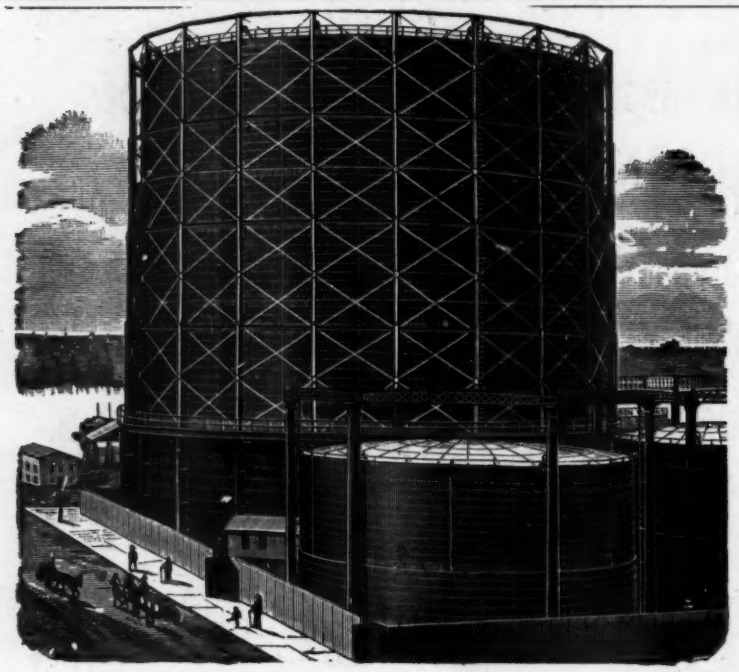

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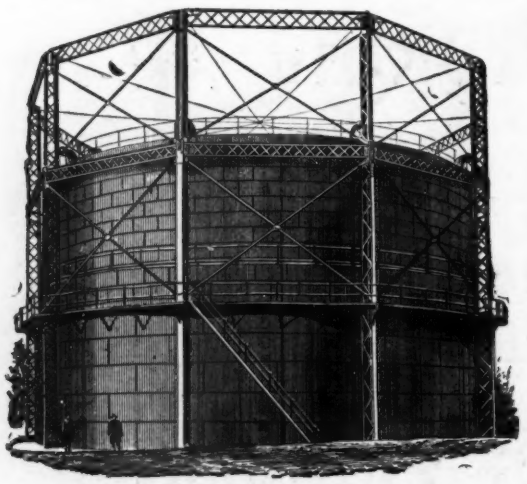

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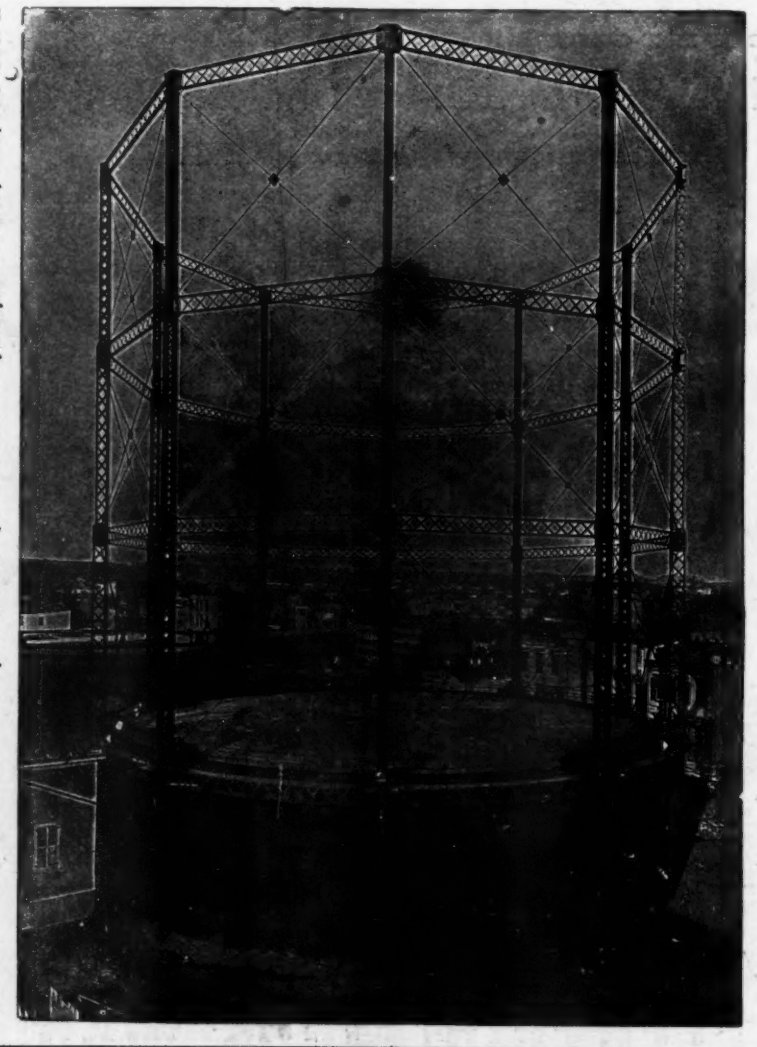

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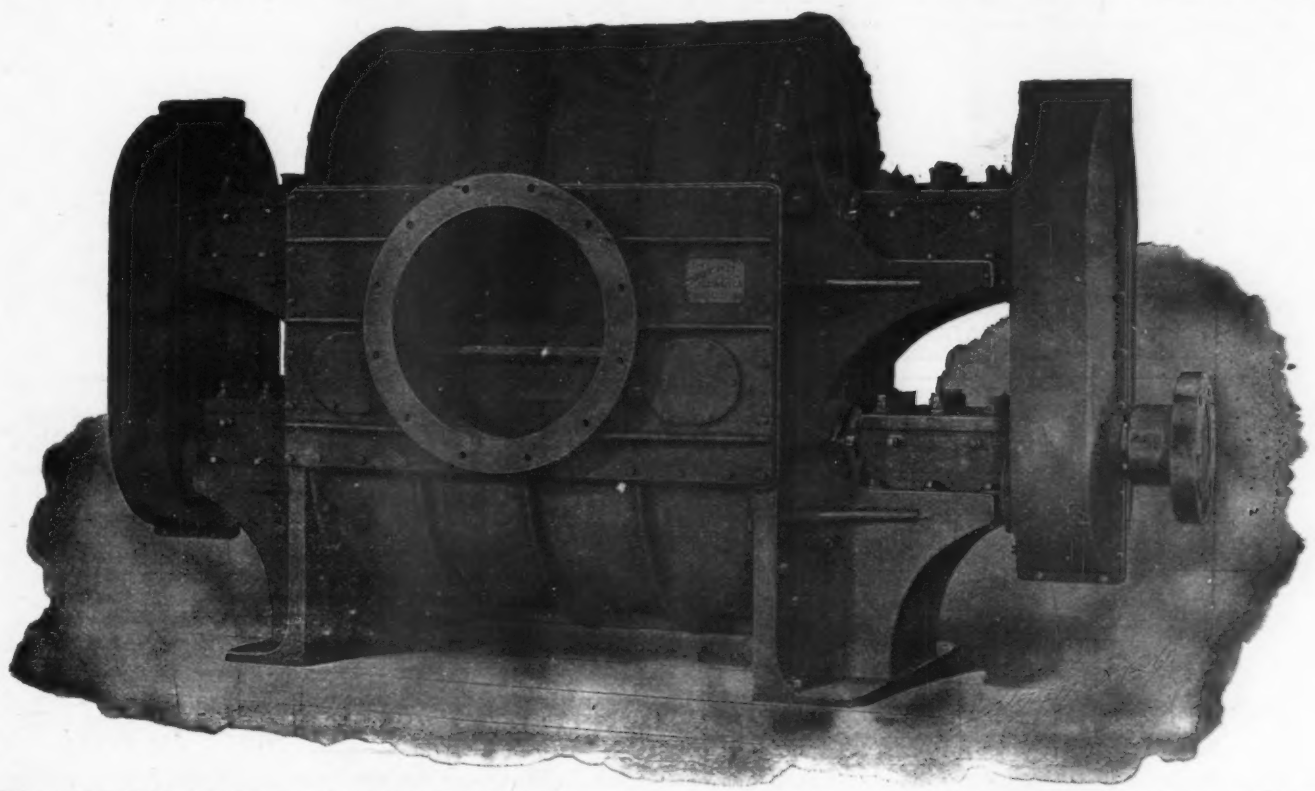

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